

THE WORLD'S PREMIER R/C JET MAGAZINE

Jet

**RADIO
CONTROL**

INTERNATIONAL

FEBRUARY/MARCH 2016

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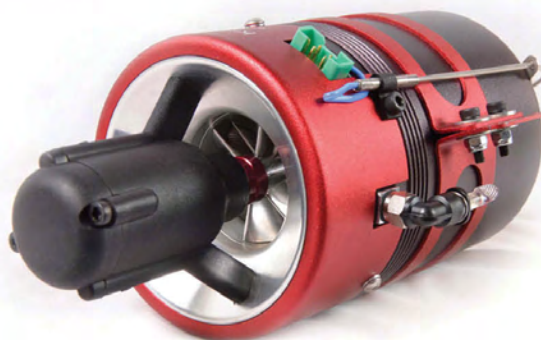
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RADIO
CONTROL

Jet

INTERNATIONAL

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ON THE COVER:

This beauty is Tomahawk's big Futura flown by Thomas Smordalen at the Karlskoga Jetpower event (see page 60 for the report). Equipped with a Hawk Turbine 190R it has over 19 hours of flight time and is still going strong!

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FROM THE COCKPIT

Latest news from around the jet-modelling world

These Dark Days ... and Nights!

As I write we are leading up to the festive season, and any chance of flying in these Northern Hemisphere wintry conditions is a challenge, so I will be containing my own modelling to just building for the next few weeks unless the sun shines and the temperature outdoors increases – I hate standing in an open field and flying in cold and windy weather! I did have the opportunity to take a ride with the Blue Angels and I really enjoyed it – if you fancy doing the same then why not visit www.youtube.com/watch?v=H6SsB3JYqQg or scan the QR code close by for a 360 degree pilots-eye aerobatic experience!



When you read this we will be into the new year (I hope you had a great festive time and Santa brought what you wanted?!), and with the daylight hours increasing from week to week thoughts will be moving towards pre-season maintenance and the new flying season approaching. So just to keep your juices flowing we have some great jet event reports and reviews from around the world of R/C jets.

Having recently attended the JMA's winter fly-in at Long Marston I was encouraged by the enthusiasm of the jet flyers in what can only be described as unusually warm and sunny conditions for the time of year – I just hope this trend continues throughout 2016.

Safe flying and happy landings!

Anniversary Year For Wings & Wheels

Dates are confirmed as the 25th & 26th June, 2016 for the Wings & Wheels Model Spectacular, the popular model show that is held annually at North Weald Airfield, Essex CM16 6AR.

2016 promises to be exciting year for the show as the airfield was built in 1916 during World War One. So the airfield will be celebrating its 100th Anniversary. And the model show, started by three enthusiastic modellers in 1986, also celebrates its 30th Anniversary! The organisers, led by Show Director Jane Stephenson, are planning displays featuring models dating from 100 years ago right up until the present day. All the usual attractions will be present, including a large trade attendance, model boat pool and displays, hovercraft, Daleks, drones, tanks, trucks, helicopters, the famous Bring & Buy and lots more – not forgetting some great model aircraft displays!

Jane also says: "If anyone has any new ideas for us we would like to hear from you!"

All enquiries to: admin@wingsnwheels.net

Or visit the show website: www.wingsnwheels.net



Mick Wilshire, 1935 - 2015

As this issue of RCJI was being prepared in October, leading R/C jet, petrol and helicopter specialists Mick Wilshire passed away on the 18th October aged 80. Best known for distributing the Italian range of Super Tigre motors, he started the model business in 1966, offering kits and components for the World Engines range of radio equipment from the USA. The Blue Max, Pylon Migit and Talisman ranges followed. In all he hand made radios for over 20 years; many were specials and one off systems.

His association with Super Tigre lasted over 40 years and working closely with the factory he was totally connected with the brand. His passion for the product often causing friction with customers! His love of aviation encompassed full size flying, both power and sailplanes. Most of his later life was spent soaring the Chiltern Hills in his LAK 12 glider. The origins of the business survive in son David's Motors & Rotors company. The photo, from a few years ago, shows Mick with son Dave and grandson William at the local club field.

A Tribute From Tony Stephenson, Chairman of Traplet Publications Ltd

From my personal point of view I would like to add my own tribute to Mick Wilshire. He was truly one of the most passionate and individual characters of the modelling world, who loved all forms of aircraft, both large and small.

I have known Mick for more than 40 years and I will remember him with enormous fondness, especially for his wicked sense of humour! I am sure, like me, that many of our readers throughout the hobby will remember this great character and enthusiast who contributed so much to the modelling fraternity.



MOTORS & ROTORS

Motors & Rotors Clock Up 20 Years!

The company was started by Dave Wilshire as a model helicopter distribution outlet for the well-known Miniature Aircraft USA and Graupner Heim ranges of helicopters. Being active in all aspects of the hobby and one of the most 'hands on' bosses in the business (we happily recommend Dave as he really knows his products!), he then guided the business into turbines and large petrol models. These specialised sectors of the hobby cannot be looked after without knowing what the customer needs. Dave is proof that flying and using the products you sell is the best way of endorsing them and proving their reliability.

Dave says:

"Over the years we have been approached by many companies to represent them in the UK, and have long relationships with companies like CARF-Models (Dave is one of CARF's biggest selling agents worldwide), JR Propo through MacGregor Industries, JetCat turbines (more than 500 turbines sold), DA engines, Zimmermann exhausts and Powerbox Systems."

Still preferring a personal service more than a web based 'box moving' businesses, Dave is known to answer emails seven days a week, early morning through too late at night. And he also answers the phone out of normal trading hours – even at the flying field!

Motors & Rotors operate out of a business unit close to Junction 20 of the M25 and Junction 6 of the M1, Monday to Friday. Weekends are spent at shows or flying with the local club.

Visit 'Motors & Rotors' at: Unit 11 Kingley Park, Station Road, Kings Langley WD4 8GW.

Call: (01923) 270405, Fax: (01923) 270129, Email: motrot@aol.com

www.motorsandrotors.com

Sarik Vacform Name Change

It was recently decided to create a new company name for Traplet's sister company, Sarik Vacform Ltd., which will now be known as Sarik Hobbies Ltd. This will consolidate three associated businesses under one banner, namely Waverley Models, David H Alderton Boats and Sarik Vacform Ltd.

Tony Stephenson will have an active part in running this company as Managing Director. Barry Atkinson, previously the Editor of RC Jet International, will be known as General Manager of Sarik Hobbies Ltd. and Janet Baker will work alongside him as Administrative Co-ordinator.

For more information on Sarik products please visit the following website:

www.sarikhobbies.com

Bob 'The Photographer'

We would like to apologize to Bob Petrie for incorrectly suggesting in the last issue of RCJI that John Petrie was the photographer of the Hunter review by Colin Straus when in fact it was Bob Petrie that pressed the button and captured the moment! We hope Bob forgives us for this 'senior moment' error, and we promise we won't do it again Bob – honest!

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Jet

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The advertisement features several circular frames containing images of jet model components: a purple and silver turbine, a black electronic control unit with wires, a blue and silver servo motor, a black and orange Savox brushless motor, a blue and silver fuel valve, and a blue electronic speed controller (ESC) with a digital display. The background is a light green gradient with a faint image of a jet engine.

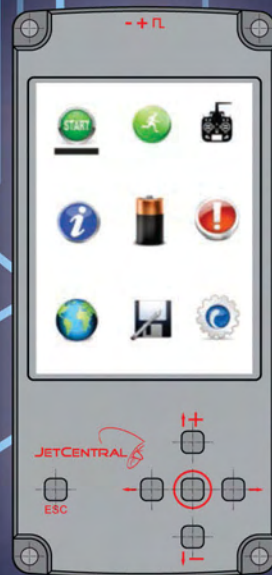
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V_ECU : 10.01 V
Amp : 0.20 V
BATTERY : 44%
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Battery_Type : LiFe
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Tank_Capacity : 03000
Consumption Correction : 000 %
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RPM : 71000
SET : 80000
THR : 35%
Temp : 23 C
Pump : 0 P
Volt : 10.01 V
Amp : 1.00 A
GLOW : ☐ **STARTER** : ☐
FUEL_V : ☒ **KERO_V** : ☐
RUNNING : ☒ **CHEETAH** : ☐
TRIM UP : ☐

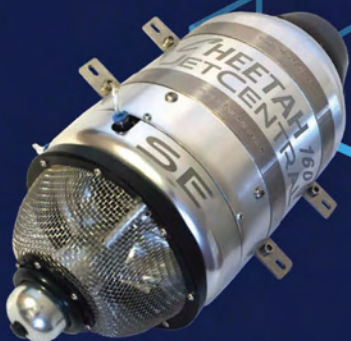
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Redwings Gryphon Evo

In this final part, Ian Titchell concludes the build of this turbine sports jet and takes to the air!

PART 3

The previous parts of this review were submitted a while ago so it's useful for a quick recap for those who don't have copies of the relevant magazines to hand. The Redwings Gryphon Evo sport jet is an all composite model designed for turbines in the 60 to 100 Newton class. The model is beautifully finished and painted but comes without much hardware or any instructions.

The model is relatively straightforward to put together although the lack of any instructions is a negative point from my perspective.

At the end of the second part of the review I had pointed out that the model comes out relatively tail heavy and that there is relatively little the builder can do to alleviate the situation using the supplied items; this is despite my version using a Jets Munt VT80 turbine. This is one of the lightest and most fuel-efficient engines in the class. The landing gear comprises a set of Electron Retracts with Boomerang Jets oleos and electronic brakes. I am using JR DS8411HV High voltage servos and running the system directly from a 2S LiPo.

Final Fitting Out

My main concern was balancing the model as it was tail heavy. The main item adding weight to the tail is the jet pipe so I ordered and fitted a Grumania lightweight tail pipe. While I was at it I moved the turbine (already a light one compared to some turbines likely to be used) forward a little. Even with my efforts to lighten the rear end as much as possible, the model still needed about 700 grams weight in the nose to balance it properly even with three LiPo batteries in the nose.

The weight saving from the new jet pipe and relocating the turbine is of the order of 200-300 grams. To be honest, there is nothing wrong with the original jet pipe and the weight saving from the steps I took is comparatively marginal on a model weighing in at 9.5 kg. I have to say that the Xicoy C of G machine was invaluable in setting the model up and balancing it accurately.

Obviously you need to get weight as far forward as possible that means that the batteries, etc. need to be mounted in the nose.

Since the nose area can only be accessed through a narrow opening over the retract mount via the canopy access is a problem. There isn't any obvious way of securing the batteries in the nose as there is no internal structure in front of the undercarriage mount.

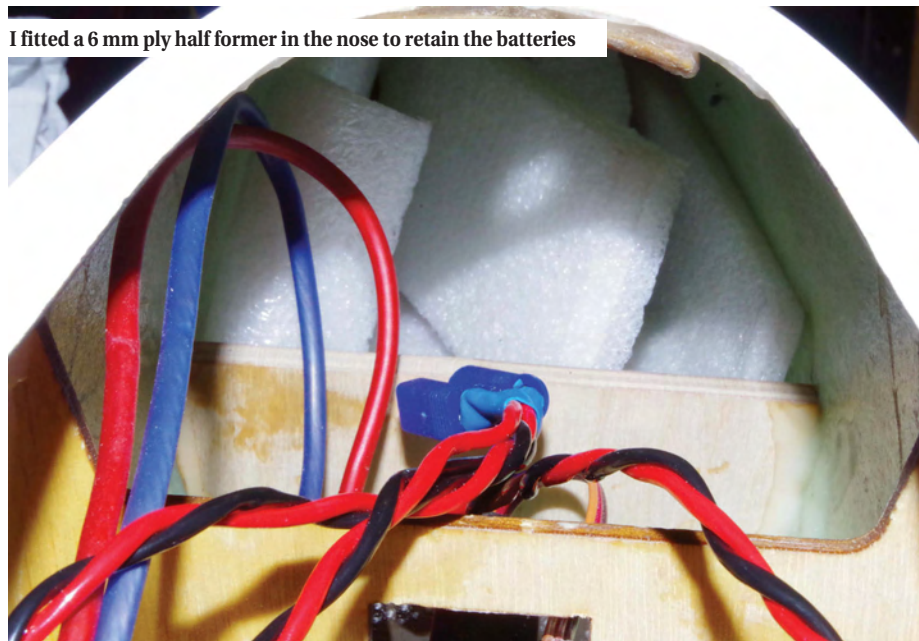
In order to retain the batteries I opted to make a simple 6 mm ply half former and to pack the batteries in place with some easily removable foam packing. Before fitting everything in place I mixed up 400 grams of lead shot and epoxy, which I poured into the nose as a permanent fixture. I also had 300 grams of lead sheet, which is secured under the batteries. This was detachable to allow me to adjust the balance point if that proved necessary.

One thought regarding the need for lead in the nose: this may be a consequence of the Gryphon design that evolved from an earlier design called the Sheliak, which certainly dates back to the NiCad era. If you used three packs of 5-cell Sub-C NiMH packs instead of three packs of 2S LiPos you probably wouldn't need to add much lead in the nose!

As we left the model at the end of the second part – assembled but not completed or flown

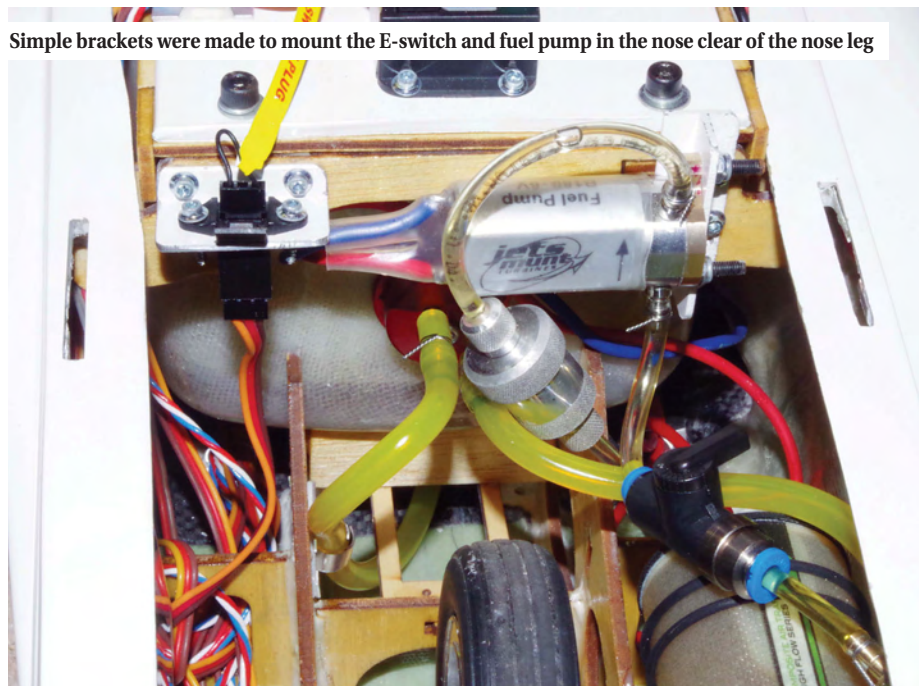


I fitted a 6 mm ply half former in the nose to retain the batteries



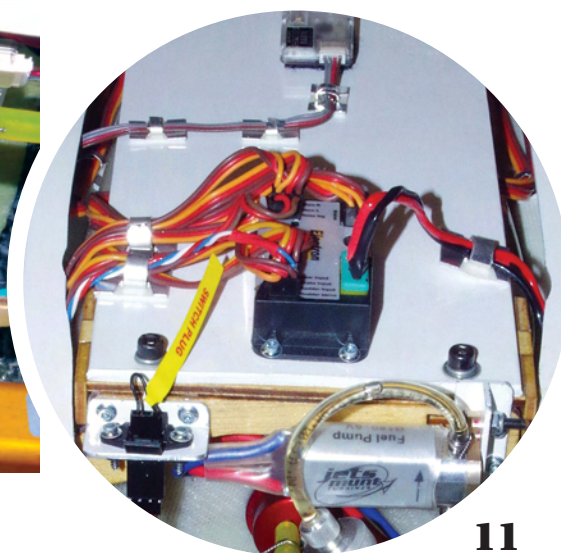
In my quest to save nose weight I fitted a longer and lighter Grumania jet pipe and moved the turbine forward; this was a lot of expense and effort and the weight saving is quite modest

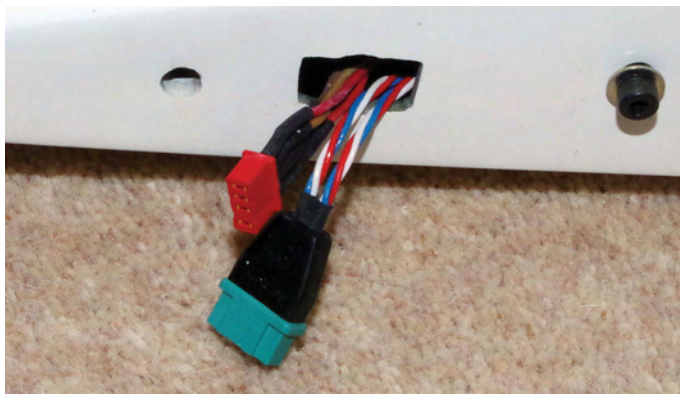
Simple brackets were made to mount the E-switch and fuel pump in the nose clear of the nose leg



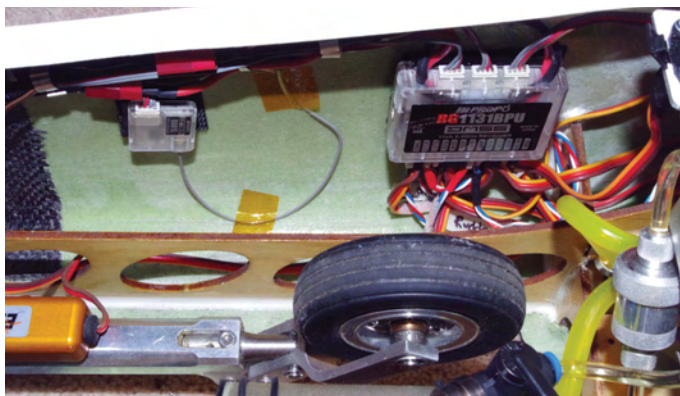
ABOVE/BELOW: An overview of the installation shows that if you cram everything in the accessible area of the nose then there isn't a huge amount of space. The Electron brakes controller (inset) is very light so I opted to mount that above the tank as it wouldn't have much effect on the C of G

A GBR-Jets CAT80 (featuring revised specification end caps) fits neatly alongside the wheel well





To simplify operating the model I used Powerbox premium wiring harness for the servos and 4-pin Deans micro connectors for the brakes and retracts



The space for the receiver is tight and there are a lot of wires. I am using unregulated LiPos to run HV servos; the turbine ECU is also safe at this voltage (I checked with Jets Munt!)

Apart from the battery mounting everything else was pretty straightforward. The supplied plywood tank cover plate was simply covered in Profilm to provide a clean fuel resistant finish. I made up a couple of brackets to take the fuel pump and e-switch for the receiver. There was room for everything, but only just. I found that a GBR jet composite fuel trap was a good option as it fitted nicely into the space available.

Given the lack of instructions setting the radio up was educated guesswork. I had spent time

setting my model up so that at 100% travel I get the following throws:

Surface Control throw at 100% ATV
Rudder $\pm 20^\circ$
Elevator $\pm 20^\circ$
Flap 0° to 50° max deflection
Aileron $\pm 15^\circ$

I opted to use triple rates as it gives more flexibility to adjust the throws should anything be amiss on the test flight. The model weighed in at 9.5 kg balanced and ready to fly less fuel.



The new jet pipe is retained using a simple ply former and brackets



It's a good idea to fit some wingtip skids to protect the finish on the wings

Test Flight and Flying Review

I would like to thank Geoff White for undertaking the initial test flights. Obviously if you ask someone to test fly a model for you it's important to be clear that it's at your own risk. I have implicit faith in Geoff's flying so I have no qualms about trusting my models to his more than capable skills.

Another important factor is that Geoff is vastly more experienced on jet models than most people, so his input would accelerate setting the model up.

The moment of truth...





Geoff elected to use take-off flaps on the first flight, and at last, daylight under the wheels!



The top scheme is markedly different to the bottom one, which Geoff said is a nice aid to orientate the model



Bottom scheme is much darker



Low and slow so Geoff is obviously comfortable with the model!

Things finally fell in place with Geoff, the weather (nearly) and a suitable venue all being available at the same time! The model was packed and comfortably fitted into my Vauxhall Insignia estate car with a bit of juggling. No more excuses so over to Geoff for his view of how the model performed...

Gryphon Evo Flying Report by Geoff White

Conditions for the maiden were far from ideal as there was a gusty 20 MPH wind, which was at 90 degrees across the runway. Nevertheless, with the press deadline looming, after a check over of the model including movements, it was decided to fly the Gryphon. Mindful of the stiff crosswind, the throttle was gradually opened, whilst concentrating on keeping the model straight by judicious usage of rudder, and within 20 metres or so the model had lifted off, showing that the VT80 had adequate power for the Gryphon.

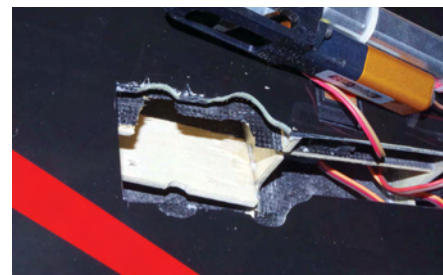
The first circuit was spent just trimming the model and, in fact the only change was a few clicks of aileron trim. The rest of the flight was spent just carrying out simple aerobatics, i.e. loops and rolls to check on the general balance/feel of the model and also checking the trim/handling in various configurations of flap and undercarriage. The general impression was that, whilst the model was a fraction twitchy on aileron, solved with more expo, the Gryphon felt very good at both medium and low speed and tracked very well.

Once the timer had gone off, the model was landed, being very careful again and using judicious amounts of rudder, as the wind was at 90 degrees and much to the relief of both Ian and myself the landing was smooth, with approximately a 15 metre roll out. After a quick change to the expo (as explained previously) and a check on the amount of fuel left to

confirm the timer was set right, the model was refuelled.

The second flight was much like the first but it was now feeling just about right, more advanced aerobatics such as four-point rolls, Cuban eights, point Derry turns, square loops were tried and they all confirmed the impression that the model was well balanced. In addition, inverted flight required a gentle push of down elevator so I suspect the C of G may be slightly forward but further tuning will confirm this.

What surprised me was the rudder was especially powerful making four-points a real pleasure. During this flight we also explored the slow speed handling a bit more as Ian wanted it flown slowly and close so that he could take the obligatory photos for the review. Again, the slow speed handling was good and confidence in the model was growing.



The aftermath; the mount is only two laminations of 3 mm ply with carbon-fibre on the top and bottom surfaces. It is a tricky repair as I need to cut into the wing skins to gain access!

The Gryphon in her element at last and looking good and making a slow pass for the camera on a grey, windy day!





This is the second landing, which wasn't perfect as the model dropped slightly just before touchdown resulting in a small bounce. Here we are looking at the model after the bounce and you can see the left undercarriage mount has failed; good job I fitted some tip skids!

The second landing should have been text book as the approach and flare were just the same as the first landing, but this time the rate of descent was too high and a small bounce occurred that, as we subsequently discovered, had broken one of the landing gear plates so at this point we retired for the day.

Looking back on the landing it is difficult to see how the model bounced but subsequent chats with other people who have flown Gryphons seems to indicate that we were using too much flap.

Once the plate is repaired and the weather allows we will fly it again and investigate this theory further.

Model Settings Established

These are the actual values on my transmitter after test flying. The 100% values of control throws were described earlier.

| | Low | medium | High |
|----------|------------------|--------------------|-------------------|
| Elevator | 41% ATV LINEAR | 55% ATV +20 EXPO | 73% ATV +35 EXPO |
| Ailerons | 69% ATV 14% EXPO | 84% ATV +27 EXPO | 100% ATV +35 EXPO |
| Rudder | 69% ATV LINEAR | 100% ATV +20% EXPO | 115% ATV +30 EXPO |

NB: I used JR 8411 high-voltage servos at 7.4 volts (nominal). These are quite fast servos and if you use slower servos/lower voltage you may want less expo.

| Flaps | Neutral | Take-Off | Landing |
|-------|-----------|---------------|------------|
| | 0 degrees | 15~20 Degrees | 50 Degrees |

The model was balanced 80 mm in front of the main axle using a Xicoy C of G gauge.

Funnily enough I have seen another Gryphon break its undercarriage after a relatively innocuous landing so I think you would do well to look at the undercarriage area especially if you plan to fly off grass. I would say is that I think that it would be wise to test fly and set up this model on an open airfield before you try to get it onto a 70 metre strip!

At this point I must admit I was a little disheartened as, at the time, I didn't have ready access to a suitable venue for several months and I had grave doubts about flying the model on the tight strip I had originally planned on using. Fortunately in the interim I have secured access to several suitable venues. Consequently I am going to keep the model and fly it on a fairly regular basis, but clearly you want a reasonably good site to fly this model from especially for the initial flights.

Aftermath

I have subsequently spoken to Geoff about where the Gryphon ranks in the scheme of well-known jet models. It is probably fair to say that it is smoother and more accurate than the Boomerang Sprint but perhaps not quite as crisp and accurate as say the CARF Ultra Flash. However, we found it significantly easier to land than the Ultra Flash.

So the first flights were over and I was relieved that they had gone well but also somewhat disappointed that the undercarriage had broken and I hadn't been able to fly the model. I was also wondering what to do next? One thing was sure and that is that I was going to have to repair the undercarriage.

Conclusions

The hard question is... would I recommend the Gryphon to a friend? Well subject to following caveats I would: the instructions are non-existent and that complicates the build slightly, so you need some building experience to do a decent job; the parts provided are superbly finished but the wood used for the undercarriage mount appears to be a little weak, which will certainly be a problem if you plan to fly off rough grass.

There aren't many other models that fill the same market niche so if you fancy one then go for it!

I am pleased to be able to report that the Redwings range can now be brought in the UK via Paul Gosling of Nexus Modelling Supplies.

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Redwings (Manufacturer)

<http://redwings.it>

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First in Flight 2015

Freshly fledged jets flock to the North Carolina skies

It's become tradition. The First in Flight Jet Rally (FIF) held for the past six years at the end of May has become the pilots' choice to maiden new jets hot out of the kit box. And what a great new crop came out for FIF 2015!

Sure, the prized and perfected builds for Top Gun competition are presented earlier in the month in Florida, but it is the atmosphere at FIF 2015, held Memorial Day weekend (May 21-24) at the Wilson Industrial Air Centre in Wilson, North Carolina, that is just right for that first flight of a brand new build.

CDs Larry Lewis and Robert Vess have taken pains to cultivate a culture of trust to ensure pilots feel safe and ready to take a calculated risk with their winter projects. Each year Lewis and Vess tweak the layout of the venue around a 4500 foot by 150 foot runway for a quick response to disabled planes and plenty of elbow room in the tent area for 'hangar queens' should things go wrong in flight. The atmosphere nurtures such a natural feeling of success that pilots, even the timid ones, respond by opening the envelopes of their new birds a bit more. But steal a glance at even the most seasoned R/C pilot during a maiden flight of his/her winter build and you are likely to see thumbs trembling on the sticks!

Steve Stricker's Skymaster F-4 Phantom is on its third life-cycle, having been repaired after two major mishaps in as many years. Fans at FIF 15 welcomed this favourite bird back home

Five Steps To Confidence

There are many factors to feeling confident before a maiden flight. According to Smithsonian Air & Space, the key to the Wright brothers successful initial flights of their gliders in early 1900's North Carolina was the extensive test and trials before take-off, initiating a practice used in all aircraft development today, R/C scale and sport jets included. R/C designer/builder/pilot Jorge Escalona follows this principle and pinpoints five key factors to a confident first flight...

Although many kits, ARFs included, may or may not be difficult to assemble, builders can't trust that every possible bug has been worked out by the kit designers. "Make sure all the surface travels (ailerons, elevator, etc.) have been programmed to your radio per the manufacturers specs," says Escalona, and he suggests the same be applied to the C of G (Centre of Gravity).

The next step is to take those specs and "go out and get input from other pilots' real-life experience." Bring that input back to the

The F-16 always cuts a great profile in the sky but this one, in local livery over the Wilson Industrial Air Centre, looks especially fierce with added ordinance



workshop and thoroughly review the plane's structure and functions.

For the third step Escalona urges pilots to "get a game plan." While still in the shop, the R/C pilot should be mapping out the first maiden flight in his/her head in terms of limits and precautions. "How many minutes will you fly?" says Escalona. "Will you keep gears down the entire flight or try to retract them?" Success comes when the objectives the pilot has mapped out ahead of time, no matter how limited, are met.

Fourth step, Escalona suggests, "Find yourself a great spotter to go through the game plan, including possible emergencies." And finally, "Have a field that is forgiving." Flame-outs or other issues are easier to deal with if there are no obstructions and the runway is long. "It gives you peace of mind," says Escalona.

"The best place to maiden is NC's First in Flight because – no elevations, no trees," says pilot/builder Mike Leshner of Pennsylvania. "It's wide open – there's room to stop without brakes, and if anything happens it's right there in front of you." Leshner should know. He ran an event near his hometown in Lancaster County, PA, for a decade. With everybody trying out the freshest of jets, there's a greater feeling of empathy all around. Additionally, vendors at FIF 15 stock up on plenty of spare parts.

Lighting Up

Confidence is also enhanced by visibility. The 2015 flying season is the year that R/C jet pilots are lighting up – by applying new, highly visible, bold paint schemes and a wide array of lighting accessories to add an illuminating touch to their scale and sport jets. New arrivals



Detail of Sal Apice's Fly Eagle Jets Hawk custom cockpit with HUD (Heads Up Display)



RCAF Lt Col. Jeff Daly's Skymaster F-4E Phantom makes a distinct 'howl' and Jeff attributes the sound to the placement of a bifurcated pipe from a Jet Central Mammoth, shown here



David McQueeney of New York with his Skymaster Viperjet in custom livery from a T-2 Buckeye aircraft. Andy Herrold did the paintwork

at FIF looked bigger, brighter and all lit up. The weather, however, started out dreary. A hefty shower greeted the 128 pilots during the first preview day at FIF 2015. But CD Lewis said, "In NC, if you don't like the weather – stick around for a day. It'll change!" Skies brightened on cue for the remainder of the week. The fresh rain added a 'new car' aroma to the field and soon the air hummed with the sounds of pilots wishing each other good luck for their first flights.

The dominant new pretty face for 2015 is the 1:5 F-104G Starfighter by Skymaster. At least five made an appearance at FIF, with an impressive formation flight during the Saturday noon break by Illinois resident Peter Goldsmith, Toronto's Doug Boyle, Tennessee resident Scott Harris, Pennsylvania's Dave Malchione and Virginia resident Kwang Ko.

Of the five, Boyle's F-104 was the most visible. The yellow and black paint scheme depicts the Lockheed Aeritalia F104S ASA-M special colours celebrating the 82nd anniversary (Oct 16, 2000) of '23rd Gruppo Stormo'. "It's an easy plane to build – very easy," he said. "It's just nerve-wracking to look at."

The full-scale F-104 is known for its wide turning radius and rope-a-dope action at low speeds. But the scale model behaves more "like a pussycat" according to Boyle after he'd maidenized his standout Starfighter at FIF 2015. Boyle equipped his F-104S with a Jet Central Rhino 200 turbine, Futaba system and all Futaba servos. The Starfighter weighs 45-50 lb at take-off, so the Rhino is more than adequate for power. After a successful maiden, the formation demos and several other flights, the F-104 did not return from FIF 2015 to Canada intact; a mishap on the final day took care of that.

Boyle says the hardest thing about building a beautiful scale model is learning not to become too attached. As a Skymaster dealer at Jets North in Toronto, many of his favourite builds eventually go to clients.

The bright orange/red and white livery of

Dave Malchione's Skymaster F-104 takes a close second to the visibility of Boyle's Starfighter. The QF-104 Starfighter paint scheme from the 83rd Interceptor Squadron appeals to Malchione because, "You can see it". A King Tech 210 powers the 48 lb F-104, guided by a Spektrum radio/receiver.

By the second preview day he'd already completed five flights and enjoyed the chance to be part of the F-104 demo. He's installed a Cortex gyro but declares, "It almost doesn't need it; it's really stable." The small fins hugging the fuselage act as stabilisers.

Body Double

Peter Goldsmith of Horizon Hobby employs a practical but pricey method for testing his latest build with confidence. He admits he's a 'little nervous' testing out new equipment on his competition grade F-104 so he makes a 'body double' to use for testing new technology. He adds proven upgrades to the original version, increasing the odds he'll return with his award-winning entry for next year's Top Gun. That way, he says, "I'm not beating the heck out of the good models."

He's upgraded the King Tech 180 turbine in the Top Gun version to a King Tech 210 he tested in the practice plane. He uses a bright Thunderbird 'fantasy scheme' for practice because it allows him to fly more aggressively. "Old eyes – bigger models – brighter models," he chuckles. At FIF 2015 he was trying out the new Spektrum 6270 high power, high performance and multiple-voltage range servos in the practice F-104. "It's got about 500 inch/ounces of torque – all metal casings," he says. "They're very nice and I'm glad, because I have to use them anyway." The King Tech 210 is "a bit heavier off the ground." With the bigger engine, he says, "There's about a 25% difference in everything; it takes off 25% quicker, flies 25% faster and on approach I'm carrying 25% less power." He smiles, "It has a lot of ZOOM!"



The Skymaster F-104 Starfighters of (l-r), Peter Goldsmith, Scott Harris, Kwang Ko, Doug Boyle and Dave Malchione in static display after a demo flight

Big Bright Ideas

Last year's winners of the FIF Wright Stuff Award, Kim and Scott Foster, the father and son R/C duo from Ohio, are not afraid of new technology. They showcased the first PARI TECH Natrix in the USA to FIF 2015. The super sleek Natrix stood out as the largest sport jet at the event. "We had it out with the Rebels and Shockwaves, and it dwarfs the UltraBandit," says Kim Foster. "Makes it look like a regular Bandit!"

The all carbon fibre jet comes with electric gear, electric brake and is built, hinged, turned out with all the servo mounts, painted, vinyl and shipped to the US "all for US\$8K," says Foster. "They [Pari Tech] are the nicest people in the world to deal with." The Fosters simply added Futaba hi-voltage servos, a Champion Power Box, iGyro and a King Tech 210. FIF 2015 was no maiden for the Natrix. "We've put in over 30 flights before this event," says Foster. At FIF 2015 "we're moving the C of G

back as we go, really dramatically changing it, but's that about it." When asked how the Natrix compares to his Tomahawk Futura, Scott Foster just grins sarcastically, "They're all ugly, slow aeroplanes. You know that!"

Some pilots are not satisfied with producing a model straight from the kit. Sal Apice of New Jersey loves to personalise his new builds. We spoke to him as he prepared to maiden his hot-out-of-the-workshop 1:3.5 Fly Eagle Jet (FEJ) Hawk. The unique and vibrant paint scheme of his Hawk took some effort and planning to produce, but the eye-popping livery was worth it.

Apice admits he is more interested in sports themes than military paint schemes, so he

Durham, NC resident Jim Martin has done 'a few small repairs' to this pristine 1:7 Fly Eagle Jets Super Hornet F-18F in Blue Angels livery. He replaced all the original FEJ hardware and reinforced the bulkheads and stab, bearings, nose gear, spars, rudders, wings and vertical stabs for assured stability and strength



Mario Tavarez of New Jersey rocks the airspace with his FEJ



The taxiway leading to the pilot stations has the look of military order to it. Contest Directors Larry Lewis and Robert Vess provide an environment of safety and confidence for pilots testing out their new builds

wondered what would Formula One racing paint schemes look like on military jets? He came across a UK aviation illustrator/designer named Bill Dady. Although Dady specialises in military themes, he produced a 1991 Williams Honda sponsorship livery for the McLaren Formula 1 for the Hawk. Dady provided Apice with high-resolution images that were sent on to FEJ.

There were some false starts at first but eventually Fly Eagle "nailed it" according to Apice. A fellow R/C pilot and builder, Nir Schweizer of Maryland, acted as a liaison with FEJ throughout the project. Schweizer loved the paint scheme so much he applied it to his smaller scale version of the FEJ Hawk.

Apice added a DetailsforScale gun pod underneath his Hawk and reinforced the formers and fuselage with carbon fibre and Marine West epoxy. "This was the last of the 'honeycomb kits'," says Apice. "I knew the weak points, so we made all of the weaknesses strengths."

In addition to the kit's new aircraft aluminium elevator and i-bar between the two stabs, he laid up carbon fibre underneath the rudder. But his brightest idea included some dynamic lighting.

"You can add a great paint job," says Apice, "You can put a bigger engine, but the one thing that makes (a model) really exciting is lighting." After researching lights for a year, Apice chose a CREE Led 1800 lumens light for his landing lights with the objective to have them visible in daylight. He's timed the landing lights to snap on as first position flaps come down. "The key is, you don't want to overpower the LEDs," says Apice. "Keep them at a constant 6 volts and use a voltage regulator." The strobes and beacon lights are from AVEO. The beacon is the Red Baron mini. The wingtip LEDs and the marker lights are Zenon LEDs. "They have a mini-driver that powers them so they're very vibrant".

Apice wasn't satisfied with the kit cockpit either, so "I made a fusion of the panels and seats" by combining an FEJ and Skygate cockpit. Two Axel Scale pilots fit right in. "After my

Jim Hiller's F-100 Super Sabre strikes the sky



maiden, I'm going to reward those pilots with a new paint job."

He has also outfitted a Boomerang XL with an array of lights, incorporating AVEO 3-in-1 power burst lights used for home-built full-scale aircraft. "Now when I'm landing, and I get behind the horizon," he says, "I actually look for the lights to make sure I'm level." A synchronisation wire pulses the flash simultaneously on each side.

Lights And Sound

Caledon, Ontario resident Blair Howkins tried out some new technology at FIF 2015 on his Tomahawk BAE Hawk in RAF Training scheme. The all-black jet is surprisingly visible, according to Howkins. Powered by a Jet Cat P160, he installed JR 8911 servos and for the first time was flying the jet with the PowerBox integrated with a 3-axis iGyro. "It flew real stable and smooth without the gyro," says Howkins, "but (the gyro) may make manoeuvres a bit more crisp." EMTEK lights adorn the Hawk, included in the Tomahawk kit. "I like to have lights when I fly," says Howkins.



Blair Howkins, of Caledon, Ontario, participated at First in Flight for the first time in 2015. Here he tries out a 3-axis gyro on his Tomahawk BAE Hawk in British Training scheme colours



Bob Violett of BVM calls this 1:5.8 scale PNP F9 Cougar a 'personal size jet'. This one was powered by a JetCat P-100RX



A Cortex 3-axis gyro helps smooth out the edges of an otherwise impeccable flight of the BVM F9 Cougar



The newest 'pretty face' at FIF 15 was the Skymaster F-104, here lined up like a colour wheel after a noon display at the Wilson Industrial Air Centre



Dave McSweeney's Skymaster Viperjet (foreground) and Jorge Escalona's Tomahawk L-39 Albatross play tag over the event



Doug Boyle returned to FIF for a second year with this Skymaster F-104 in Aeritalia F104S ASA-M special colours commemorating the 82nd anniversary of '23rd Gruppo Stormo'



Mark Giummule of New York earned the JPO Top Gun award at FIF 15 for this Aviation Design Diamond in eye-popping red livery



Scott Geller of Stanhope, NJ, pulls some serious 'G's' as he inverts this muscular A-10 Warthog



Vendors on hand at FIF 2015 come well stocked in case things go wrong during a maiden flight. Here Dreamworks has its portable store set up in the midst of the tent area for easy access to 'hangar queens'

The Hawk "flies very scale" with the Jet Cat P160, but "you need take-off flaps for it to rotate; if you don't, you wonder if it's going to take-off," warns Howkins.

Another Canadian resident, RCAF Lt Col. Jeff Daly, prepared to maiden his brand new Skymaster F-4E at the event. "I found a great paint scheme no one else has," says Daly. It's a European camo scheme in shades of green and grey adopted by the 82nd Aerial Target squadron at Tindal AFB in Florida for the QF-4s used there as drones. Daly installed a bypass to accommodate a Jet Central Mammoth, as well as JR servos and a PowerBox Cockpit SRS. He painted the nose gears and door to replicate the real QF-4 and added a DetailsforScale lighting system and a Futaba gyro on the nose gear. Everything else is stock. "I'm just looking for a good test flight this week," he said. Daly is meticulously prepared,

so naturally he nailed his test flight and logged in many more. He discovered that the position of the bifurcated pipe adds a realistic whine to the F-4 as it passes overhead. The sound is distinctive and adds to the overall scale impression.

The Saturday night Southern BBQ was held in a large hangar used to store scale and sport jets during the event. Pilots debriefed each other on their maiden flight successes and failures while dining on food hot off the grill. CD's Lewis and Vess stood in front of banners from 1960s air races that had been held at Wilson while handing out awards and recognition to their volunteers and the participating pilots.

Academy of Model Aeronautics (AMA) President Bob Brown presided over the event, speaking briefly about supporting scientific development and technology, and the growing threat to the hobby from unregulated drones

BELOW: 'Mini Me!' Nir Schweizer of Maryland was so taken by NJ resident Sal Apice's 'Formula 1' paint scheme for the FEJ Large Hawk, he applied the same to the smaller scale version



The 'Mass Electric Foamie Launch' on Saturday included an entire squadron of E-flite F-86 Sabres



and changing FAA rules. He outlined steps pilots could take to improve the integrity of the hobby despite the current atmosphere. (See Additional Links)

The Scale Realism Award went to Nir Schweizer for his de Havilland Vampire. Best Military Jet went to local resident Jim Martin for a spectacular FEJ F-18 he'd rebuilt, reinforced and decked out with ordinance. The Crowd Pleaser Award went to Florida resident Pablo Fernandez for his riveting displays of Rebels, Shockwaves and hot sport jets.

Doug Boyle took the 'First in flight at FIF' award for his E-flite UMX Habu. Mark Giummule of New York gained the JPO Top Gun award for an arresting bright red Aviation

Design Diamond. Technical Achievement went to Terry Hahn for his splendid smoke presentation on his 'Jet Waco' biplane. But the FIF 2015 Wright Stuff Award went home with Dave Malchione, Jr of Pennsylvania. Along with Dave Sr. and Pete Malchione, the family were congratulated for their perennial contributions to the hobby and for producing top-notch R/C scale and sport jets.

One hundred twenty-eight pilots left North Carolina relieved that their maiden flights were now behind them, their brightly painted, illuminated scale and sports jets tucked back in trailers and SUVs, for the most part intact, with the summer flying season spread invitingly before them.



Inverted view of Illinois resident Peter Goldsmith's Skymaster F-104. He uses this 'body double' of the same plane that won him 'Best Jet Performance' at Top Gun 2015. He tries out new technology on the body double to apply to the competition version



Pennsylvania resident Dave Malchione, Jr. was one of several pilots to fly Skymaster F-104s. This one earned him the 'Wright Stuff' award for 2015



Scott Harris of Tennessee always chooses patriotic paint schemes for his R/C jets. Here he goes 'north of the border' and a nod to Canada with his choice of RCAF livery on his Skymaster F-104



The inverted pass of the Skymaster F-104 by Scott Harris accentuates the slender fuselage of the Starfighter



Kwang Ko, of Chantilly, VA, was on a buddy box learning to fly his Skymaster F-104 at last year's FIF. Now he has mastered the aircraft, as he takes the Starfighter vertical



Undercarriage of NC resident Jim Martin's FEJ 1:7 F-18F as it inverts over FIF 2015. Powered by a JetCat P-200 with TamJets pipe, the 54 lb (wet) F-18 is "a really good slow-flying aeroplane" according to Martin



Sal Apice used copious amounts of carbon fibre and Marine West epoxy to “turn weaknesses into strengths” in this superb FEJ Hawk

CONTACTS

AVEO lighting Red Baron Mini: www.aveoengineering.com/redbaron-mini/

Bill Dady aviation illustrator: www.clavework-graphics.co.uk

Bob Brown AMA President speaks: www.youtube.com/watch?v=x999ei0Allg

Jeff Stubbs Phantom 3 video of FIF 2105: www.youtube.com/watch?v=pheu87TcW40&feature=youtu.be

First in Flight 2015 (Excellent collection of photos by John Romero): www.facebook.com/FIFJETRALLY

F104G Starfighter 82 anno: www.simmerspaintshop.com/forums/showthread.php?t=2832&page=66

www.916-starfighter.de/Large/Stars/wA6935.htm

Honda Sponsorship Formula 1 livery 1991: www.f1fanatic.co.uk/?attachment_id=59689

Pari Tech Natrix video: www.youtube.com/watch?list=PL8iHs7pgHqAaeSSg4NgFzqJXWphFJENwe¶ms=OAFIAVgH&v=uactallH_a4&mode=NORMAL&app=desktop

Pari Tech Natrix website: www.paritech.de/modellbau/natrix/galerie.php

PowerBox Cockpit SRS: www.powerbox-systems.com/produkte/powerbox-systeme/powerbox-cockpit-srs.html

QF-104 83rd Interceptor Squadron: www.thisdayinaviation.com/7-1958/

Wright Brothers: <http://airandspace.si.edu/exhibitions/wright-brothers/online/fly/1900/testflying.cfm>

Jet



Another view of Malchione's Skymaster F-104 powered by a King Tech 210. Malchione insists the F-104 “almost doesn't need” a Cortex 3-axis gyro he installed. “It's really stable”



Escalona's Tomahawk L-39 taxis down the runway followed by Malchione's Skymaster F-104



Pablo Fernandez has been a reliable crowd-pleaser with highly animated sports jets for six years at FIF. Here he demonstrates the Pirotti Rebel Pro available through his Elite Aerosports company

Germantown, Maryland resident Nir Schweizer won the FIF 2015 Scale Realism award for his NirlyBuilt produced de Havilland Vampire



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KingTech K-160G

Our engine expert Colin Straus describes this latest 'compact' turbine from KingTech

It is hard to keep up with the constant flow of new turbines that have emerged from the KingTech factory in Taiwan over the last few years, with this latest turbine, the brand new K-160G with a nominal 16 kg of thrust being the seventh KingTech turbine that RCJI has had the pleasure of testing.

Detailed Description

After its long trip from the factory, the engine arrived packed in the usual sturdy cardboard box, with formed protective foam in place to make sure the engine and parts arrived undamaged.

Opening the box gave access to the turbine itself, which continues the family theme of having a number of red anodised parts, including the front cover; engine mounts, etc. whilst the main case has a graduated gold colour finish.

The external appearance of the engine is very clean and uncluttered, with the kero burner, thermocouple and start and running valves all being mounted internally, with just

three external connections, the first of these being for a heavyweight cable providing power for the starter and kero burner whilst the second is for the lightweight data cable. The final connection is for the single fuel line from the fuel pump, this being via the usual and very neat rotatable fitting KingTech use.

As is now becoming standard with new KingTech turbines the compressor is a superbly machined item, this contributing substantially to the excellent performance, whilst the turbine wheel is also beautifully manufactured and finished.

The K-160G is notably more compact than most other 120 to 180 Newton turbines being around 9 mm less in diameter and anything up to 90 mm shorter than other engines in this thrust range, whilst also being lighter than many of these.

It is closest in size to the Merlin 140, but of course significantly more powerful, so is perfect for any airframe with limited space for the turbine, or where a ducted installation is preferred, making larger engines impossible to install. It can of course be used in any model requiring this level of thrust, and will make installation and servicing simpler due to the increase in space within the airframe around the smaller case size.

Ancillaries

Other items supplied include the HP-Tech fuel pump, in the case of the K-160G this being the ZP30020FKT unit, the very small and light Xicoy ECU with its matching system analyser, leads, tubing, manual fuel valve, fuel filter and in the case of this test engine a FOD guard.

As the engine received for testing was from the first production batch it was supplied without a manual, but this did not cause any problems as I am now very familiar with the connections and set-up of KingTech turbines.

Also not supplied was the ECU battery, which is due to restrictions imposed by the Taiwanese postal authorities on shipping Lithium battery packs (in common with many other countries now), so a 3 cell 9.9 V LiFe battery of 2100 mAh was used, this proving perfect even in the relatively cold weather of the test period.

Engine Testing

Installation onto my test rig was simple, and once all of the leads and tubes had been connected up it took just a couple of minutes to programme the ECU using the System Analyser to match the radio being used, after which the fuel tank was filled, the fuel line to the turbine primed (having been disconnected from the engine whilst this was done to avoid

Turbine Package Contents:

- KingTech K-160G Turbine
- Fuel Pump (HP-Tech ZP30020FKT)
- Xicoy ECU (Electronic Control Unit)
- System Analyser
- Leads
- Instruction Manual
- Fuel Tubing
- Manual Fuel Valve
- Fuel Filter with mounting clips
- Decals



The complete KingTech K-160G package as received for testing; an instruction manual was not supplied, as the engine is so new it had not been completed



The compact size of this powerful turbine is very evident here, being substantially smaller than most turbines of equivalent thrust

flooding) and everything checked before the engine was readied for a run.

The first start was very straightforward, with the engine firing up almost immediately before going through the various stages of the start procedure, this taking around 65 seconds, after which control of the turbine was passed to the radio system (later starts from warm took around 55 seconds).

Once the engine had settled at idle we began to take performance readings, and were able to do this without any fuss throughout the

rpm range, the engine being nice and stable at all intermediate points. Further runs gave the same smooth and flame free starts, whilst the running characteristics were excellent throughout the testing, with no vibration or rumbling being detected at any time.

The maximum corrected thrust measured during testing was 164.2 Newtons at full throttle and 126,000 rpm, equating to 16.74 kg, this being comfortably above the 16.0 kg claimed by KingTech, whilst the fuel consumption was also above that claimed at

a measured 528 grams (665 ml) per minute, rather than the 480 grams per minute shown in the specifications.

Idle gave a corrected 7.2 Newtons (0.7 kg) thrust, which is commendably low for a powerful turbine such as this, and should allow nice steep approaches and short landings in suitable models. It should be remembered that although the testing was all carried out using Kerosene, all KingTech engines run happily on Diesel, which is often easier to obtain, particularly in Europe.



Beautiful machining of the compressor can be seen in this photo, as well as the shape of the air intake



Looking down the tailcone, the superb turbine wheel casting can be clearly seen



This very neat rotatable fuel inlet fitting makes it easy to run the fuel tubing neatly as required by almost any installation



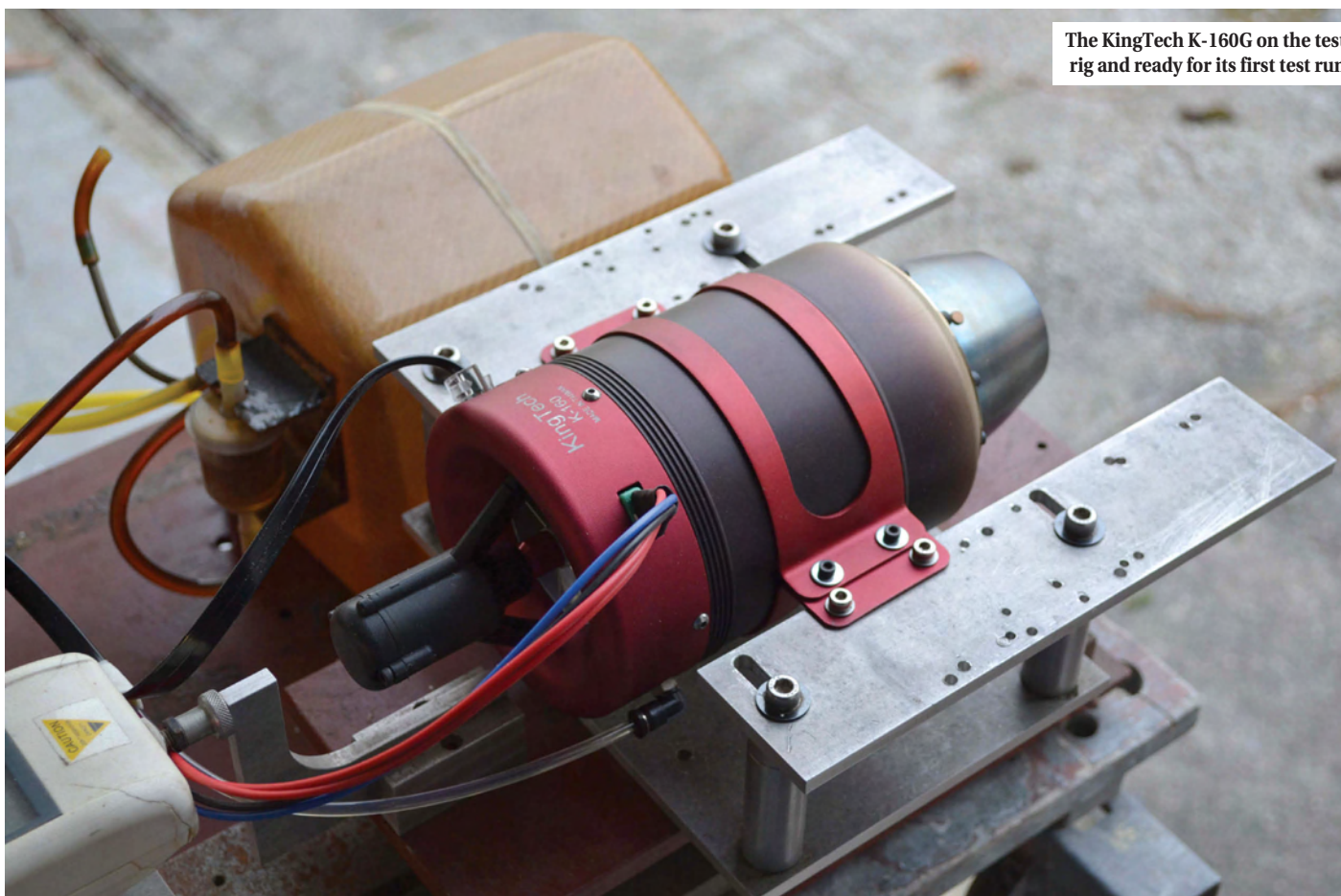
The tiny HP-Tech fuel pump enables a very smooth idle and extremely consistent running characteristics

As in previous tests of KingTech turbine the acceleration and deceleration times were commendably fast, being measured at around 4 seconds from idle to full power and back, and of course once running at anywhere above a high idle the throttle response was almost instantaneous.

Also very low was the EGT (Exhaust Gas Temperature), which reached a maximum of 502° centigrade at full power, although the actual temperature is difficult to compare between engines as the exact position of the

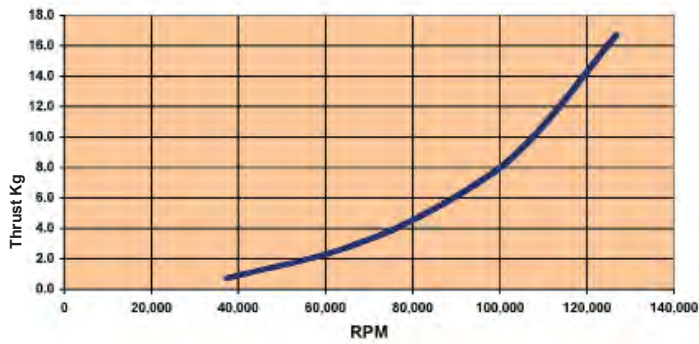
thermocouple in the hot gas stream can affect the readings quite substantially.

Once all of the performance figures had been taken a further run was made with the supplied FOD guard installed, and no detectable difference in thrust or EGT was found, which is relatively unsurprising given the reasonably open mesh used in the FOD guard. Having said this, the mesh is certainly fine enough to remove all but the smallest particles from the incoming airstream, so should do a good job in protecting the turbines internal parts.

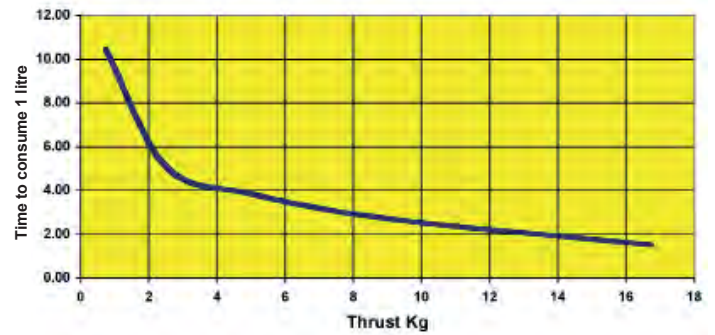


The KingTech K-160G on the test rig and ready for its first test run

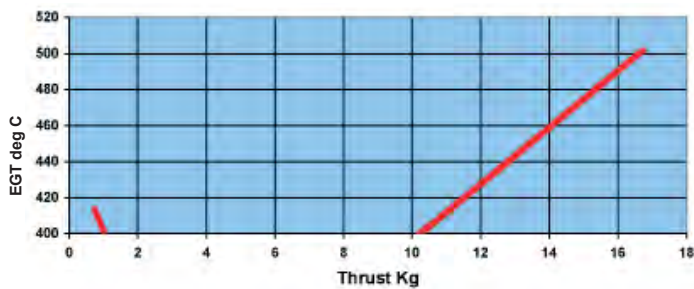
Graph 1
Kingtech K-160G - Thrust/RPM



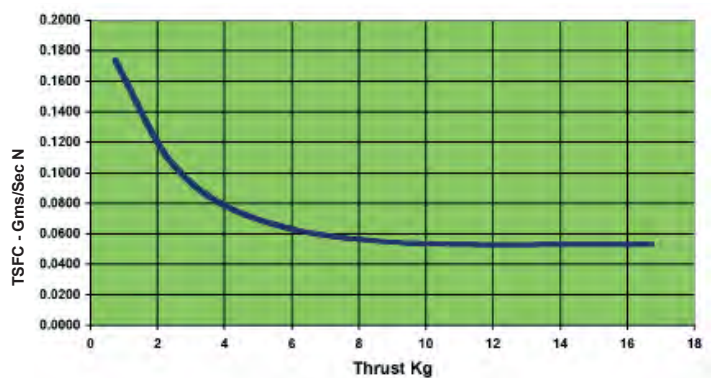
Graph 2
Kingtech K-160G - Fuel endurance / Thrust



Graph 3
Kingtech K-160G - EGT Deg C/Thrust



Graph 4
Kingtech K-160G -



In Summary

The K-160G is yet another very impressive turbine from KingTech, and with its compact size and weight allied to a very impressive and above specification performance it is certain to become a popular addition to the range. It is due to become available at the beginning of 2016, just before this test is published, and like other KingTech turbines it is of course protected under the lifetime warranty offered.

Jet



Xicoy's tiny and very light ECU proved a perfect match to the K-160G

Test Results

| | |
|--------------------------------|------------------------------------|
| Idle rpm | 37,000 |
| Idle Thrust | 7.2 Newtons (0.70 kg/1.6 lb) |
| Idle Temp. | 414 deg. C |
| Max. rpm | 126,000 |
| Max. Thrust | 164.2 Newtons (16.7 kg/36.9 lb) |
| Max. Thrust Temp. | 502 deg. C |
| Fuel Consumption @ Max. Thrust | 665 ml/min |
| Fuel used | Kerosene |
| Lubricant | Mobil II Jet Oil |
| Fuel/Oil ratio | 5% (20:1) |

Weights

| | |
|---------------------|-----------------------|
| Turbine inc. Mount) | 15344 grams (3.38 lb) |
| Ancillaries | 463 grams (1.02 lb) |

Sizes

| | |
|----------|-------------------|
| Length | 260 mm (10.24 in) |
| Diameter | 103 mm (4.06 in) |

Contacts

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This supplied FOD guard was tested on the engine and proved to have no negative effect at all on the maximum thrust level or temperature



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Performance Comparisons

The gas turbine performance comparison chart has long been a popular feature of the magazine, and is a very useful tool when trying to select a suitable turbine for a particular model. To make this selection process easier we have redesigned the chart, rating the turbines by their power output rather than efficiency, and also highlighting those turbines currently being produced over those that have been discontinued, but which may well still be available second-hand.

To further clarify the chart the decision has been taken to use only Newtons for the thrust figure, as this is usually used by the manufacturer as part of the engine description, as well as using only metric figures for weight and fuel capacity, albeit with conversion factors also included for ease of conversion.

We hope that the new layout does what is intended and makes the chart both simpler to use and more useful to all model jet pilots.

KEY:

- = Discontinued Model
- = New Engine Test
- = Tested previously

NOTES

- 1** RPM figures shown are the maximum specified by the manufacturer.
- 2** Exhaust gas temperature (EGT) is nominal as the actual EGT varies substantially depending on the exact position of the sensor.
- 3** The maximum thrust figures are shown in Newtons, as this is the figure commonly used by manufacturers to describe a particular engine. Conversion factors are; a) To convert to kg, divide the Newton figure by 9.81. To convert to lb, divide the Newton figure by 4.45.
- 4** To convert cc to US fl. oz. multiply the cc figure by 0.0338.
- 5** To convert Litres to U.S Quart multiply the Litre figure by 1.06.
- 6** To convert kg to lb, multiply the kg figure by 2.20.
- 7** The thrust to weight ratio is calculated by taking the thrust figure of the engine and dividing this by the total weight of the engine, ancillaries and fuel for 5 minutes at full power.
- 8** TSFC (Thrust Specific Fuel Consumption) – the lower the figure the more efficient the engine.
- 9** The weight of the engine includes all parts attached, such as starter, mounting lugs and temperature sensor, etc.
- 10** The weight of ancillaries includes ECU, pump, valves etc, and a notional ECU battery weight has been included for those engines that are supplied without a battery.

| Engine | Date Tested | Max RPM (Note 1) | EGT (max thrust) °C (Note 2) |
|-----------------------------|---------------|---------------------|---------------------------------------|
| JetCat P20-SX | Apr-12 | 245,000 | 621 |
| KingTech K-45G | Jul-15 | 170,000 | 674 |
| Wren MW44 Gold | Jun-06 | 195,000 | 570 |
| Artes JF50 Bee | Oct-03 | 175,000 | 537 |
| Behotec J55HP | Feb-04 | 160,000 | 620 |
| JetCat P60-SE | Jan-10 | 165,000 | 610 |
| JetCat P60 | Dec-06 | 165,000 | 695 |
| Simjet 1200 | Dec-02 | 160,000 | 510 |
| Jet Central Super Bee | Jul-06 | 180,000 | 600 |
| Funsonic FS-60 | Jan-05 | 165,000 | 564 |
| Kingtech K-60G | Jun-14 | 161,000 | 452 |
| Wren MW54 Mk III | Jul-05 | 160,000 | 585 |
| PST J600R | Mar-05 | 162,000 | 630 |
| Heward Microjets Wasp 2 H20 | Feb-06 | 148,000 | 717 |
| Wren MW54Super Sport | Apr-05 | 160,000 | 599 |
| KingTech K80E | Mar-09 | 146,000 | 521 |
| Jets Munt VT80 | Feb-12 | 150,000 | 600 |
| Behotec J66HP | May-02 | 120,353 | 542 |
| Wren 80 Jubilee | Apr-13 | 160,000 | 655 |
| Graupner G-Booster 80+ | Dec-07 | 165,000 | 712 |
| Jets Munt Merlin 90G | Jan-09 | 152,000 | 597 |
| JetCat P80-SE | May-09 | 124,500 | 585 |
| Wren 100 KPro | Oct-11 | 160,000 | 664 |
| Hawk 100R | Oct-06 | 175,000 | 766 |
| Jet Central Falcon | Apr-06 | 126,000 | 689 |
| JetCat P90-Rxi | Jun-13 | 130,000 | 615 |
| Jets Munt M100XBL | Oct-13 | 152,000 | 677 |
| Jet Central Rabbit | Jul-12 | 152,000 | 676 |
| Robbe RP120 | Jul-12 | 115,000 | N/A |
| JetCat P120-SE | Sep-07 | 123,100 | 561 |
| BF B100F | Jul-12 | 125,000 | 785 |
| JetCat P120-SX | Mar-10 | 119,000 | 559 |
| JetCat P140-RX | Dec-11 | 125,000 | 682 |
| Jets Munt Merlin 140 | Jun-11 | 130,000 | 600 |
| Kingtech 140 | Jul-12 | 123,000 | 586 |
| Wren XL200 | Jul-07 | 120,830 | 747 |
| Jetcraft 130+ | Jul-12 | 119,000 | 720 |
| Frank TJ-70/16 | Apr-04 | 120,000 | 588 |
| Wren 160K Pro | Jul-12 | 123,000 | 588 |
| JetCat P160-SX | Oct-08 | 126,000 | 744 |
| Simjet Nexus 3600 AES GE | Feb-06 | 118,000 | 605 |
| KingTech K-160G | Feb-16 | 126,000 | 502 |
| Jets Munt Merlin 160G | Mar-06 | 118,600 | 727 |
| Kingtech K-170F | Aug-11 | 123,000 | 674 |
| Jet-Italia Pulse 17 | Jul-12 | 118,000 | 730 |
| Behotec JB-180GE | Jan-10 | 123,000 | 658 |
| Jetcat P180-RX | Jul-12 | 126,000 | 699 |
| HYBL H16 | Feb-15 | 122,000 | 820 |
| evoJet B180vx | Jul-12 | 124,000 | 750 |
| Kingtech K-180G | Aug-13 | 123,000 | 603 |
| Hawk 190R | Jul-12 | 131,000 | 782 |
| PBS Velká Bíteš TJ20 | Feb-13 | 119,000 | 495 |
| Kingtech K-210G | Oct-14 | 121,500 | 620 |
| Jetcat P200 | Nov-09 | 112,000 | 598 |
| AMT Olympus HP | Apr-14 | 108,500 | 833 |
| Behotec JB220 | Dec-14 | 123,000 | 662 |
| Jetcat P200-SX | Nov-09 | 112,000 | 615 |

(All figures are corrected to Standard Atmosphere conditions (15 degrees C, 1013.25 millibars)

| | Maximum Thrust Newtons (Note 3) | Fuel flow at max. thrust cc per minute (Note 4) | 5-minute max thrust fuel required - Litres (Note 5) | 5-minute max thrust fuel load Kg (Note 6) | Engine weight Kg (Note 6) | Ancillary weight Kg (Note 6) | Installed weight w/5 mins fuel at max thrust-Kg (Note 6) | Thrust to weight ratio (Note 7) | TSFC Efficiency Index gms/sec/N (Note 8) |
|--|---------------------------------|---|---|---|---------------------------|------------------------------|--|---------------------------------|--|
| | 24.5 | 105 | 0.53 | 0.43 | 0.37 | 0.21 | 1.0 | 2.47 | 0.0565 |
| | 45.4 | 198 | 0.99 | 0.81 | 0.76 | 0.37 | 1.9 | 2.39 | 0.0589 |
| | 46.5 | 176 | 0.88 | 0.72 | 0.68 | 0.30 | 1.7 | 2.78 | 0.0516 |
| | 49.5 | 206 | 1.03 | 0.84 | 0.92 | 0.52 | 2.3 | 2.22 | 0.0568 |
| | 50.0 | 213 | 1.06 | 0.87 | 0.76 | 0.55 | 2.2 | 2.34 | 0.0582 |
| | 57.4 | 300 | 1.50 | 1.23 | 0.87 | 0.48 | 2.6 | 2.27 | 0.0733 |
| | 58.0 | 282 | 1.41 | 1.15 | 0.87 | 0.70 | 2.7 | 2.17 | 0.0664 |
| | 60.1 | 216 | 1.08 | 0.88 | 1.04 | 0.82 | 2.7 | 2.23 | 0.0492 |
| | 60.8 | 247 | 1.23 | 1.01 | 0.96 | 0.50 | 2.5 | 2.51 | 0.0554 |
| | 61.8 | 220 | 1.10 | 0.90 | 0.75 | 0.61 | 2.3 | 2.78 | 0.0487 |
| | 62.1 | 313 | 1.57 | 1.28 | 0.88 | 0.42 | 2.6 | 2.46 | 0.0664 |
| | 62.8 | 238 | 1.19 | 0.97 | 1.03 | 0.35 | 2.3 | 2.73 | 0.0519 |
| | 62.8 | 246 | 1.23 | 1.00 | 1.14 | 0.65 | 2.8 | 2.29 | 0.0535 |
| | 76.5 | 284 | 1.42 | 1.16 | 1.03 | 0.39 | 2.6 | 3.02 | 0.0507 |
| | 77.5 | 313 | 1.57 | 1.28 | 0.96 | 0.35 | 2.6 | 3.05 | 0.0552 |
| | 80.0 | 347 | 1.74 | 1.42 | 1.31 | 0.47 | 3.2 | 2.54 | 0.0593 |
| | 84.4 | 258 | 1.29 | 1.05 | 1.01 | 0.20 | 2.3 | 3.81 | 0.0415 |
| | 85.1 | 334 | 1.67 | 1.36 | 1.34 | 0.55 | 3.3 | 2.66 | 0.0536 |
| | 86.2 | 373 | 1.87 | 1.52 | 1.09 | 0.31 | 2.9 | 3.02 | 0.0577 |
| | 90.8 | 385 | 1.93 | 1.57 | 1.01 | 0.43 | 3.0 | 3.07 | 0.0579 |
| | 95.6 | 351 | 1.75 | 1.43 | 1.01 | 0.33 | 2.8 | 3.51 | 0.0501 |
| | 96.0 | 364 | 1.82 | 1.49 | 1.49 | 0.40 | 3.4 | 2.89 | 0.0518 |
| | 98.0 | 372 | 1.86 | 1.52 | 1.13 | 0.37 | 3.0 | 3.33 | 0.0517 |
| | 98.1 | 290 | 1.45 | 1.19 | 1.62 | 0.34 | 3.2 | 3.17 | 0.0404 |
| | 103.0 | 483 | 2.42 | 1.97 | 1.51 | 0.60 | 4.1 | 2.57 | 0.0641 |
| | 103.6 | 417 | 2.09 | 1.70 | 1.66 | 0.38 | 3.7 | 2.82 | 0.0536 |
| | 105.7 | 416 | 2.08 | 1.70 | 1.00 | 0.28 | 3.0 | 3.61 | 0.0547 |
| | 106.0 | 389 | 1.95 | 1.59 | 1.09 | 0.45 | 3.1 | 3.45 | 0.0479 |
| | 118.3 | 500 | 2.50 | 2.04 | 1.80 | 0.55 | 4.4 | 2.75 | 0.0552 |
| | 122.5 | 412 | 2.06 | 1.68 | 1.54 | 0.63 | 3.9 | 3.23 | 0.0460 |
| | 124.1 | 487 | 2.44 | 1.99 | 1.27 | 0.53 | 3.8 | 3.34 | 0.0518 |
| | 124.1 | 442 | 2.21 | 1.81 | 1.46 | 0.40 | 3.7 | 3.44 | 0.0487 |
| | 142.1 | 545 | 2.73 | 2.23 | 1.60 | 0.30 | 4.1 | 3.53 | 0.0523 |
| | 144.9 | 525 | 2.63 | 2.15 | 1.30 | 0.30 | 3.7 | 3.94 | 0.0494 |
| | 144.9 | 598 | 2.99 | 2.44 | 1.72 | 0.41 | 4.6 | 3.23 | 0.0530 |
| | 149.9 | 548 | 2.74 | 2.24 | 1.79 | 0.40 | 4.4 | 3.45 | 0.0500 |
| | 157.3 | 674 | 3.37 | 2.75 | 1.76 | 0.55 | 5.1 | 3.17 | 0.0563 |
| | 157.7 | 599 | 3.00 | 2.45 | 1.62 | 0.55 | 4.6 | 3.47 | 0.0519 |
| | 158.0 | 648 | 3.24 | 2.65 | 1.65 | 0.45 | 4.7 | 3.39 | 0.0527 |
| | 159.5 | 584 | 2.92 | 2.39 | 1.56 | 0.49 | 4.4 | 3.66 | 0.0500 |
| | 161.9 | 536 | 2.68 | 2.19 | 1.71 | 0.47 | 4.4 | 3.77 | 0.0452 |
| | 164.2 | 665 | 3.33 | 2.72 | 1.53 | 0.46 | 4.7 | 3.56 | 0.0529 |
| | 165.7 | 637 | 3.19 | 2.60 | 1.87 | 0.35 | 4.8 | 3.49 | 0.0526 |
| | 168.4 | 713 | 3.57 | 2.91 | 1.73 | 0.43 | 5.1 | 3.37 | 0.0565 |
| | 169.5 | 652 | 3.26 | 2.66 | 1.68 | 0.49 | 4.8 | 3.57 | 0.0507 |
| | 171.4 | 589 | 2.95 | 2.41 | 1.70 | 0.55 | 4.7 | 3.75 | 0.0470 |
| | 174.4 | 690 | 3.45 | 2.82 | 1.64 | 0.39 | 4.8 | 3.67 | 0.0542 |
| | 177.1 | 497 | 2.49 | 2.03 | 1.71 | 0.38 | 4.1 | 4.38 | 0.0468 |
| | 180.6 | 769 | 3.85 | 3.14 | 1.70 | 0.51 | 5.4 | 3.44 | 0.0547 |
| | 181.7 | 765 | 3.83 | 3.13 | 1.74 | 0.42 | 5.3 | 3.50 | 0.0562 |
| | 186.3 | 504 | 2.52 | 2.06 | 2.80 | 0.36 | 5.2 | 3.64 | 0.0358 |
| | 200.9 | 669 | 3.35 | 2.73 | 2.13 | 0.49 | 5.4 | 3.83 | 0.0447 |
| | 207.2 | 789 | 3.95 | 3.22 | 1.80 | 0.41 | 5.4 | 3.89 | 0.0521 |
| | 211.8 | 801 | 4.00 | 3.27 | 2.45 | 0.48 | 6.2 | 3.47 | 0.0531 |
| | 226.5 | 845 | 4.23 | 3.45 | 3.10 | 0.80 | 7.4 | 3.14 | 0.0487 |
| | 230.6 | 806 | 4.03 | 3.29 | 1.71 | 0.55 | 5.6 | 4.23 | 0.0449 |
| | 234.1 | 791 | 3.95 | 3.23 | 2.50 | 0.51 | 6.3 | 3.82 | 0.0447 |

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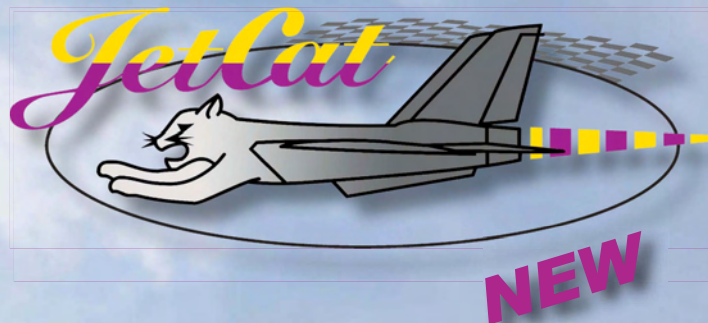
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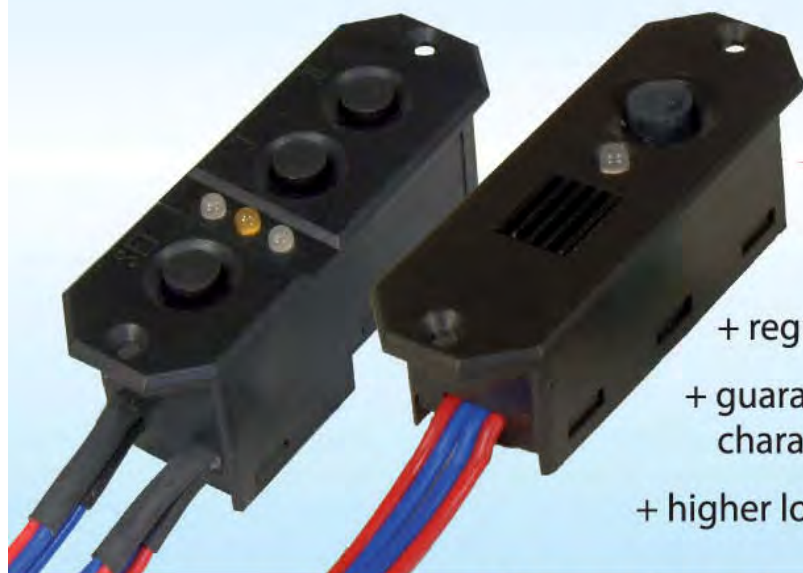


// While pulling several Gs in a maneuver, the airframe simply must be held together by the strongest glue on the planet. I'm Pablo Fernandez of Elite Aerospots and I, like most of the guys who fly jets, never use anything but ZAP on a project of this magnitude. //

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Jet World Masters 2015

Held in August 2015 the 11th Jet World Masters saw the competition come back to where it all began back in 1995 for the inaugural event – Germany!



Germany's Burkard Dotzauer concentrates hard while flying his Eurofighter in Luftwaffe colours under the watchful eye of Stephan Voelker

Situated at Leutkirch in the Allgau region of southernmost Germany, not far from Lake Constance and amid rolling Alpine like pastures, Leutkirch-Unterzeil airfield forms part of a fabulous estate complete with castle belonging to Erbgraf (Count) Erich Waldburg von Zeil, which extends to many thousands of hectares, forestry being the main business. It turns out the Count, Honorary Patron of the 2015 event is quite a fan of R/C flying and, as such, it seems quite likely that other events of a similar nature might well take place at this location in the future! As a very scenic part of the world, let's hope this is the case!

Down To Business

With a weather forecast promised throughout the week that flying events kept their fingers crossed for the Competition's first day started, as usual, with a flying display of both full size and R/C aircraft, followed by a parade of participating nations along with speeches from the organisers and local dignitaries.

As the Teams march past the crowd it's a good opportunity to see the huge differences in team sizes from one nation to another. England's sole entrant, David Gladwin, cut a lonely figure in the line-up compared to the large teams fielded by other European nations, the USA and China. Having said that, anyone can potentially walk away as World Champion in one of the two weight classes and it's this 'all to play for' atmosphere that hung over us – spirits were high with anticipation!

Monday morning, the first day of competitive flying dawned to the sound of models being fettled in the main hangar/marquee, a multitude of languages being spoken, all with the one goal of being as ready as possible for the first round flight.

Malta's Brian Busuttil had the honour of kicking things off with his MiG-15. Sadly, the model was lost part way into the flight – heart breaking to see when so much effort, not to mention money has been spent to make it this far! After a pause to recover the model, flying continued, thankfully, without too many problems.

With a dozen or so flights completed, you start to form opinions, both alone and with others as to who's done well and who's made some errors, though second guessing how the judges see things is never wise and it's only when scores are posted do you know who the front runners are.

It's Not All About Flying!

As the flying action continued on the flightline, so in one of the airfields permanent hangars behind the control tower did the other important aspect of the competition – static judging. Models at this level are, as you would expect, of the highest standard and a treat to the eyes of a casual observer. Under scrutiny of the Static Judging Team, though, each model's credentials are severely tested.

They sit at a table whilst every model



This large BAe Hawk flown by Belgium's Jean Pierre Zardini has a very light fibreglass lay-up to keep within the 20 kg limit

entered is placed before them at different angles whilst they compare, shape and detail etc. against a dossier of pictures and drawings of the full size example provided by the entrant. Their experience enables them to see things many of us wouldn't spot. As with flying, accuracy is the key! A popular marque of aircraft in an eye-catching colour scheme isn't necessarily going to do well here!

Much of the speculation falls on the models being entered for the first time – are they as good as they look? As most models have competed before, their score will likely not be too unexpected.

There is one more aspect that needs to be tested – model weight. Having helped David Gladwin in the previous two JWM competitions I can tell you this is not without its worries! You can weigh the model at home and be just under the 13.5 or 20 kg, depending on which category you've entered and then be shocked when, suddenly, you're several grams over at the official weigh-in!

As the models are weighed 'dry' the problem might be that not all the fuel has

been drained (ask us how we know!) or that some other un-needed bit of kit hasn't been removed out of the fuselage (ask us how we know!). I've seen more than a few weigh-ins and most models are 'very' close to the limits, which, of course, means there is virtually no room for error.

Camaraderie

Sometimes, no matter how much you've prepared for a competition, lady luck deserts you! Engines can flame out resulting in landing badly, undercarriages suddenly refuse to retract and so on...



Malta's Brian Busuttil had the honour of flying first with his MiG 15. Sadly, the model was written off a few minutes after this photo was taken



A strong USA Team brought along the wives too



The home team – Germany. With names like Stephan Voelker, Thomas Gleissner and Frank Westerholt on board they're formidable opponents



Competitors head back to the hangar following the thorough Monday morning pilots brief

Andy Andrews of Team USA found himself in just this situation with his L-39 Albatros during pre-competition practice. When competitors are five thousand miles from home with very limited workshop tools, you can't help but feel the party is over for them when something like this happens! Not so! Before our eyes Andy was offered the use of another JetCat engine and no less than Stephan Voelker stepped in to repair (overnight) a badly de-laminated wing, putting Andy back in the position of being able to compete. When he needed to repair some paintwork around the front of his canopy, reigning champion, Vitaly Robertus appeared with an airbrush and ensured the job was done to a high standard. It was great to see such generosity!

Observations

There were some new and interesting aircraft this time out. Luxembourg's Lucien Gerrard entered his new FanJet 600 (see the video interview link at the end for more details), an interesting concept for all you turbine aficionados, and Germany's Martin Schempp, with his 'Iskra', completely scratch built to name but two.

The BAe Hawk remains a popular subject and there were some such as Jean Pierre Zardini's, which have a very lightweight lay-up, enabling a larger scale model, yet remaining under the 20 kg limit. Chatting to various individuals in the hangar there were some fairly drastic attempts to save further weight from profile pilots to carbon fibre tyres!



Germany's Thomas Gliessner flew this gorgeous F-104 Starfighter and finished in third place in the 20 kg category. I much prefer to see 104's with tip tanks fitted though!



For the second JWM in a row the four-man Chinese team all flew the Hongdu L-15 Falcon, specially designed for the team. Three used JetCat 180's the other a Jet Central Cheetah. These are completely new models to those flown in Switzerland at the 2013 JWM



This Behotec powered F-16 is from Scale Jets and campaigned by Luigi Arnaboldi of Italy. Luigi finished a creditable eleventh in the 20 kg class



Lucien Gerard from Luxembourg flew this Fan Jet 600. An interesting concept based around a Wren turbine (see video link for more info)



Ales Marhoun from the Czech Republic entered his 'standard' factory finish Skymaster F-16 powered by a Velka Bites TJ20



England was represented by a single pilot, David Gladwin. Possibly the last time he will enter JWM I'm told! Who will fly the flag for England in 2017's competition?



Not the first model of a PZL TS-11 'Iskra' to enter JWM, but this one, built from scratch by Germany's Martin Schempp over several years rewarded him with fifth place overall in the 13.5 kg class



Young Federico Rosina with his Fiat G-91R. The fuselage is from a kit, with other parts handmade. Power is provided from a Jets Munt giving 14 kg of thrust. Federico finished in third place in the 13.5 kg category. Surely, one day he will return home to Italy as champion? A very consistent flyer!



Philip Avonds poses with his old pal and fellow fighter pilot Col Paul Rorive, who flew the full size Magister in this colour scheme (see video link for interview)



David Gladwin wheels his JetCat powered Airworld Hawk back to the hangar after his first round flight. If his helper looks familiar... yes, it is RCJI contributor, Dave Wilshe of Motors and Rotors. He visited the competition for the first few days



Andy Andrews (centre) is helped by Jim McEwen and David Ribbe with his L-39 Albatros. Having suffered a flame out in practice and needing considerable wing repairs, Andy did very well to even take part. Heart warming to see the level of willing help he received



When USA team member, Andy Andrews, found himself needing some airbrushing work around the canopy, no less than Vitaly Robertus stepped in to ensure Andy got the colour match he needed



Not all models are the latest tech' fiberglass! This lovely Gloster Javelin was built from the Mick Reeves kit by Bert Hazeborg from the Netherlands. Sadly, it was badly damaged on take-off, though hopefully is repairable!



In a reversal of positions, Vitaly Robertus helps fellow countryman, Pavel Lapshov carry his 13.5 kg class Yak 130 off the strip. Pavel stunned all by taking the 13.5 kg title at his first attempt

A New Champion

Sadly, due to the pressures of work Team RCJI were only able to be present at the competition until the Wednesday and so we only saw the first and part of the second round flights. As we left I saw no reason to suppose that there were going to be any 'upsets'. After all the reigning champions had been in place for the previous two JWM competitions and looked to be making fair progress!

Enter, Pavel Lapshov from Russia! This eminently likable lad is normally seen calling for and assisting Vitaly Robertus with his fabled Yak 130. Here, Pavel stepped out of the shadows with his own stunning Yak, in the 13.5 kg class. To cut a long story short, he won the title at his first attempt, toppling Belgium's Philip Avonds off the top spot! No mean feat and a stunning performance!

I saw Pavel a few weeks later when he passed by the RCJI stand at Germany's Jet-Power show. His contented smile said it all! I don't think it had still fully sunk in at that point! Congratulations also go to Vitaly Robertus on retaining the 20 kg title and to Germany for lifting the Team title.

For all the results and video links, see below.

Jet

Final Results:

www.jwm2015.com/en/competition

Check out some exclusive video clips and pilot interviews from the event at: thehobbyhub.com/air/news/jet-world-masters#.VnLK8vmLTcs



ABOVE/BELOW: Francis Laurens waves to the crowd as his son Stephan takes to the air with own design Alpha Jet powered by two 80 Newton turbines



On his way to winning the 20 kg category title for the third time in succession, Vitaly Robertus helps carry the fabled Yak 130 back to the hangar after his second round flight. A stunning model by any standard

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(Colchester Models Navy Cat, photo by Kiera Malham)

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Dolphin

Colin Straus describes the assembly and flying of this sizeable sports jet from Fei Bao

Having been extremely impressed with the flying abilities of the Fei Bao Dolphin S that I assembled last year, I was delighted to have the opportunity to review its larger brother, the standard Dolphin, which has a span of 92 in (2330 mm) and length of 104 in (2650 mm), being designed for turbines of 160 to 200 Newtons thrust. As the Dolphin design and construction is almost identical to the Dolphin S I will not cover every area in detail, instead the focus will be on the basic aircraft and any differences with the smaller model. Conveniently I had a JetCat P180-RX that did not have a home so this was quickly earmarked for the Dolphin, as it was right in the middle of the recommended power range.

Subtle Changes

As I have come to expect from Fei Bao, the Dolphin was superbly packed into an extremely strong multi-layer (large!) box, and when unpacked was found to have suffered no damage at all during its long trip from China. Immediately apparent was the very neat

internal construction, with the ply formers being laminated with carbon fibre on both sides, this giving a very strong yet light structure when combined with the fibreglass/Airex/carbon fibre mouldings.

Also very nicely completed was the paint finish, this being virtually flawless, with a deep, even gloss, and is particularly hard, reducing the chances of scratching the finish. Included in the kit was the air operated retract system, complete with oleos, wheels and brakes, as well as manual air control valves, air-line, connectors, air tanks and fill valves. A set of three moulded fuel tanks were also supplied, as were the control horns, pushrods and clevises.

It should be noted that the Dolphin I have is from the first batch, and that there have been some subtle changes made between this and later examples; the first and most noticeable of these being the move from the level, rounded wingtips of the review model to a new tip design identical to that of the Dolphin S, with an up curling pointed tip.

Also changed have been the main oleo

legs, these now being of trailing link design as opposed to the standard vertical oleos in the review model.

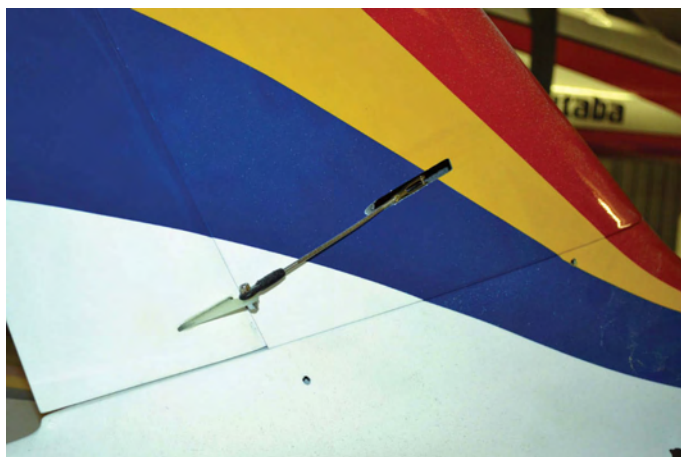
Last of the major changes is the doing away of the nose gear door as well as the main inner doors; there having been problems with the main inner doors in particular being sucked open at high speed. Due to this I removed the inner main gear doors from the model (suggested by the factory), but did keep the nose door, as these are not normally any problem, operating this with use of a Clippard valve actuated by the nose leg when it retracts. This simple and light solution is ideal for sport jets using just nose wheel doors, as it does away with the need for an electronic valve, or manual valve and servo.

Assembling the Dolphin

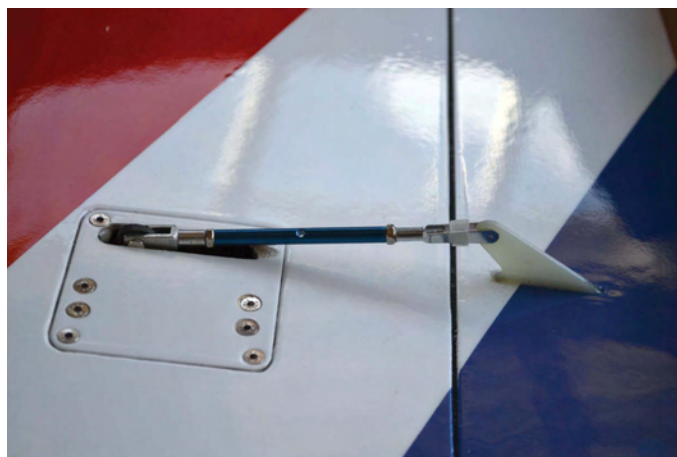
Assembly commenced with the tail surfaces, with the rudder servo being installed first, a Futaba BLS155 fitting perfectly, the control horn being glued into the surface using Aerotech epoxy. Conveniently Fei Bao had

Your author and proud owner with the completed Dolphin at a sunny Debden for the first flights

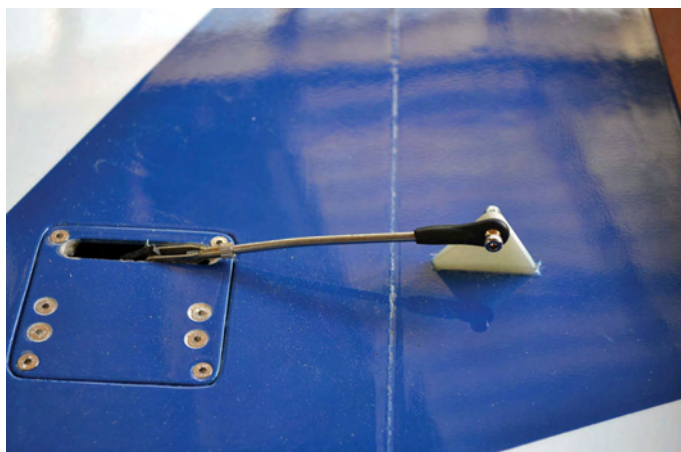




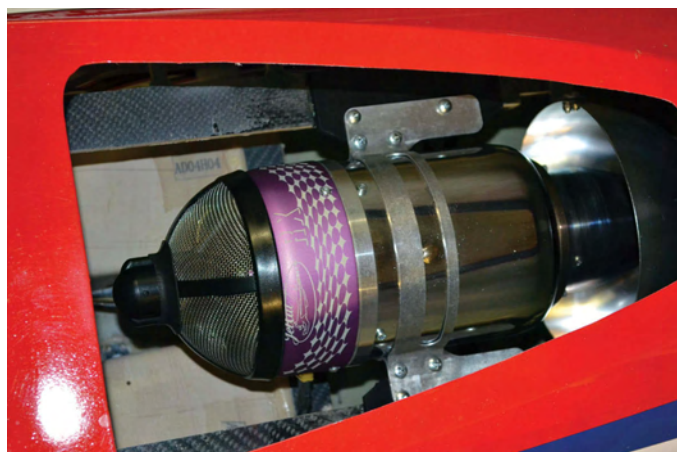
Rudder horn and linkage were very straightforward, note also the holes for the securing screws for the fin post clamps



Nice short aileron linkage is very rigid and slop free, although the supplied parts were replaced with Metric fittings I had in stock



Flap linkage photo shows the new flap horn that was produced to improve the geometry and the effectiveness of the flaps



JetCat P180-RX turbine in place in the model, with the tailpipe also carefully aligned and secured

machined a slot where the control horn fits, this just requiring opening up with a small router bit in my Dremel to allow the horn to be installed. The pushrod was then made up from the parts supplied in the kit, using the radio to centre the servo whilst the pushrod was adjusted for length, this completing the fin/rudder.

The tailplane/elevator halves had similar treatment, these being fitted with Futaba BLS452 servos, after which all three surfaces were fitted onto the fuselage and extension leads run forward through the rear fuselage section to the fuselage joint, securing these to the inside of the fuselage and keeping them well away from the tailpipe.

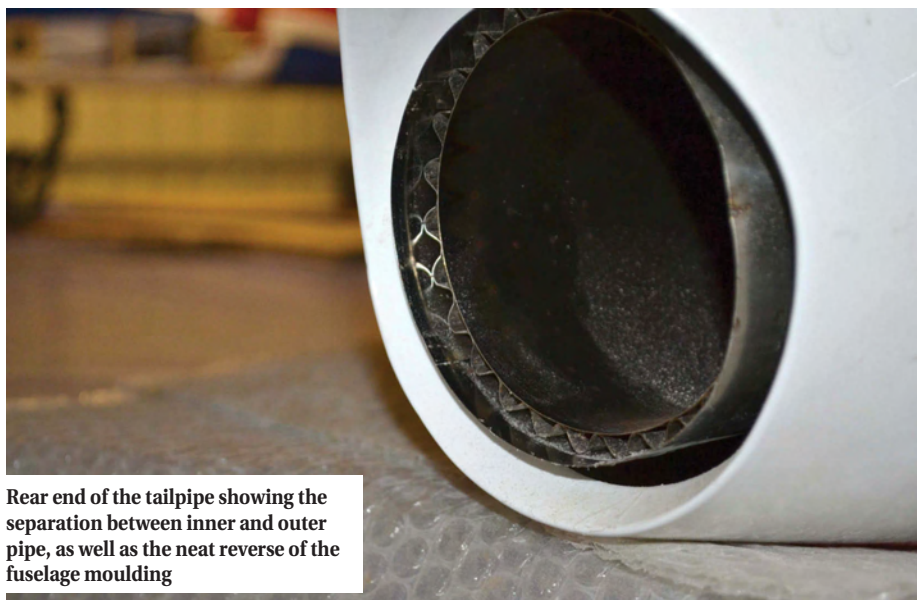
The wings were also very straightforward, my first job as usual being the removal and disassembly of the retract units, oleos and wheels, prior to these being checked for any slight problems and reassembly with judicious quantities of thread-locking compound.

I was pleased to see that the nose wheel steering system utilised a servo mount on the nose leg itself, with a short direct pushrod to the steering arm, as this system is almost bulletproof and much more reliable than systems using cables and a remotely mounted servo, with the ongoing danger of the cables fouling the retracted leg. The aileron (BLS451) and flap servos (BLS452) were then installed and control horns fitted, although this time I did not use the supplied horns for the flaps, as these are really designed for use with control

surfaces that move both up and down in relatively small amounts, so aileron, elevator, etc.

For the flap I made up my own fibreglass horns with the clevis pin position being made much further back on the flap, which gives significantly better mechanical advantage when the flaps are lowered. Usefully, the flaps are able to be extended much more than those on the otherwise very similar Dolphin S, which will be useful when landing on shorter runways.

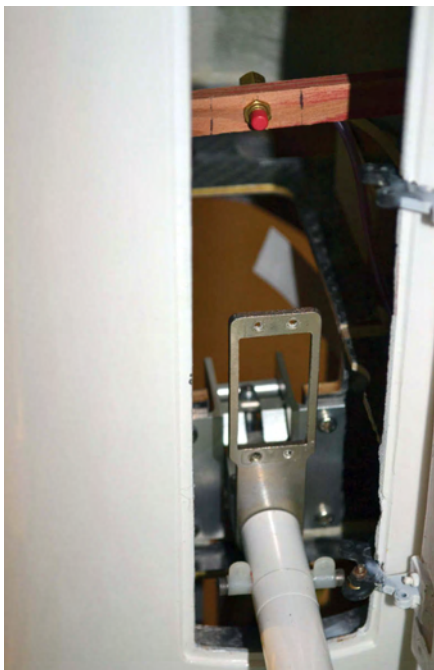
Robart airline connectors were used on the wing to fuselage connections, with the fuselage halves being glued into holes in the wing root section of the fuselage. The wing panels slide onto the large diameter carbon-fibre wing tube, and are secured with a single large knurled threaded knob each from inside the main wheel wells in the bottom of the fuselage, this screwing onto a threaded insert protruding from the wing root.



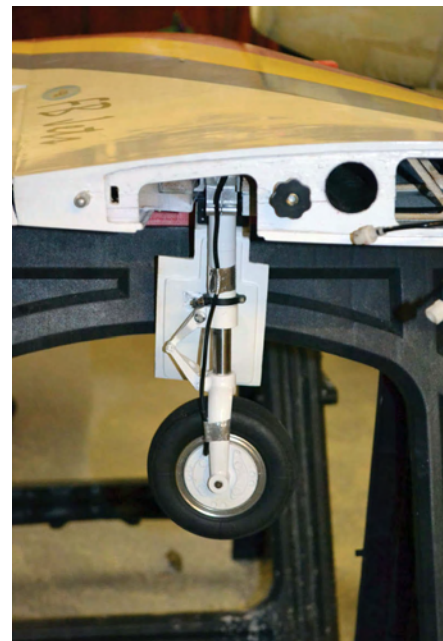
Rear end of the tailpipe showing the separation between inner and outer pipe, as well as the neat reverse of the fuselage moulding



The nice sturdy nose leg should absorb even the worst landings!



Nose wheel steering servo mount is part of the retracting part of the nose leg, allowing a direct pushrod linkage



The main legs are just as strong as the nose leg, with large tyres capable of grass field use; note also the knurled knob that is part of the wing retention system

Work now moved on to the forward fuselage, with the various leads and air lines being run as required, prior to the three fuel tanks being siliconed into place; the main tank on the bottom of the fuselage under the rear part of the air intake ducting and the two additional tanks to the left and right sides of the fuselage above the intake ducts and main tank.

The two fuselage halves were then joined and the JetCat P180-RX turbine installed on some high-quality ply mounts, which in turn were glued and screwed to the turbine mounting rails, after which the front mounts of the supplied twin wall tailpipe were also screwed to the turbine mounting rails, having been carefully aligned with the rear of the turbine cone first.

Installations

The radio installation was very straightforward, being almost identical to that of the Dolphin S, with the Futaba R6014HS receiver being mounted onto the main equipment plate under the forward part of the very large canopy, with the addition of the PowerBox iGyro 3e that was installed for flight testing as part of its recent review. Also installed onto the plate at this time was the JetCat V10.0 ECU, the mechanical retract and brake air valves and their associated servos, with air lines being run from these to the retracts, nose door and brakes, whilst the air tanks were siliconed in place onto the bottom of the fuselage, on either side of the fuel pump.

A pair of battery mounting trays were made up from plywood and were glued to the fuselage formers at the front of the cockpit area, these accepting the 6.6 V 3000 mAh LiFe radio batteries, which are retained with a pair of strips of hook and loop material, whilst the 9.9 V 2100 mAh LiFe ECU pack was attached to the main equipment board using the same method. Power from the radio batteries is run to the PowerBox BaseLog battery backer, and this also regulates the voltage being fed to the Futaba R6014HS receiver to a constant 5.9 volts.

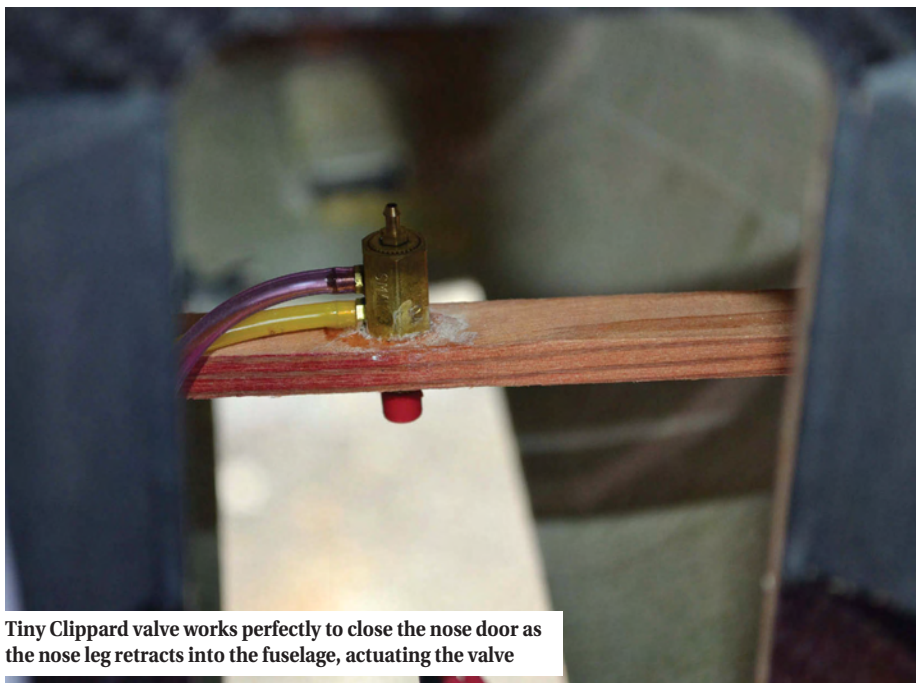
Access to the internals of the fuselage is superb, with the huge, one-piece canopy being easy to remove, but very secure once in place, making all of the installation work much easier than in some jets I have built in the past.

All-up dry weight came out at 17.5 kg, with no nose-weight being required for balancing – the recommended position proving to be perfect after flight testing. A final pressure test of the air system was made before the model left the workshop, with no problems found, and a test run of the engine in the airframe also took place without issues, so all that was left was to go flying!

Flight Testing

The first flights were made at our regular jet site at Debden and could have been a rerun of the test flights of the smaller Dolphin S, with the model flying superbly right from the start. As usual before first flights the model was given a thorough check over by flying colleagues as well as by myself to ensure nothing was missed, with the control deflections and directions being double checked. With the turbine having been test run in the model at home nothing untoward was anticipated here, and as expected the 180-RX fired up immediately and was soon idling, with the model ready to go.

Taxiing the Dolphin out onto the runway



Tiny Clippard valve works perfectly to close the nose door as the nose leg retracts into the fuselage, actuating the valve



ABOVE: With the large canopy removed there is superb access into the fuselage for installation and maintenance

revealed that it behaved extremely well on the ground being stable yet able to turn reasonably tightly without dragging a wingtip.

Lined up on the centreline the throttle was pushed forward and brakes released, allowing the model to surge forward and very quickly reach flying speed, whereupon



ABOVE & LEFT: The Dolphin was used to test the PowerBox iGyro 3e, which can be seen at the rear of the main equipment plate (inset)

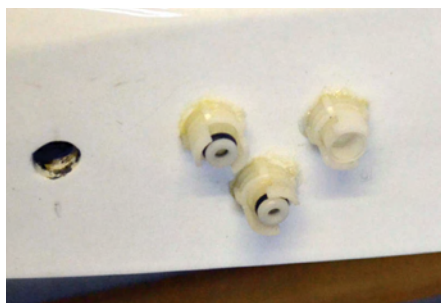
a steady pull back on the elevator stick caused the nose to lift, followed a second later by the main wheels, the Dolphin climbing away strongly, with the more than ample power from the turbine.

I was pleased to see that all three undercarriage legs disappear as soon as the retract switch was operated, with the nose door also closing fully. With the landing gear retracted almost no trim was required to have the model flying straight and level, and it was already clear that this model was a particularly smooth flyer, it being rock steady in the air, showing no signs of being affected by odd gusts of wind.

Once at a safe height the throttle was pulled back to around the half stick position, at which level the 180-RX provides plenty of power for normal flying and rolling manoeuvres, the throttle only then being opened further for prolonged verticals and large loops, etc. Speed proved to be high, but not excessively so; the large yet light airframe being limited by the increase in drag when at full power or in dives, making it difficult to over speed the model. However, the light weight comes into its own when the model is asked to climb steeply, with continuous vertical climbs to the site limit being easily performed.



The three fuel tanks were secured in place with silicone sealant, as were the air tanks seen to the left of the photo, with the fuel pump installed between these



Robart air quick connectors were glued into place in the wing roots, the matching connectors in the wings being left loose

Being immediately happy with the model it was straight into some aerobatics, with loops, inverted flight, both normal and point rolls as well as a slow roll, and various combinations of these being performed, the Dolphin coping with all of these without issue, and with great precision. Slowing the model down at height showed that the stall was extremely gentle, with the nose dropping at a very low speed indeed, lowering the flaps reducing this speed still further, although the model does take longer to recover from a flapped stall.

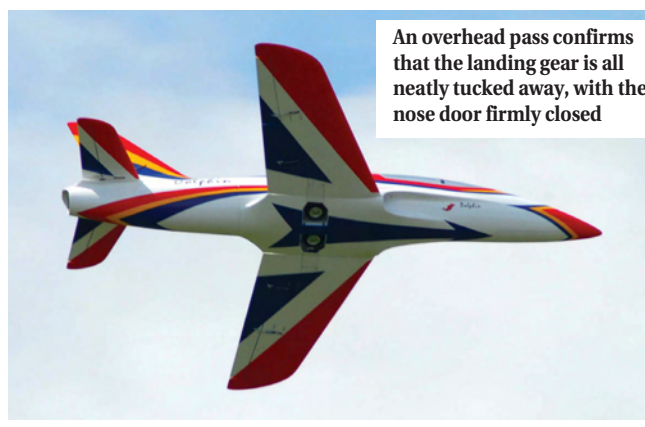
With the timer bringing the fun to a close the landing gear was lowered; a visual check showing all three legs down and locked, after which a landing circuit was flown, landing flaps being deployed when the model was on final approach. In this landing configuration the Dolphin adopted a very stable, slightly nose up attitude, with the effective flaps keeping the speed under control with the engine above idle, until the elevator was eased back and the throttle reduced to idle, allowing the model to gently sink onto the runway with the main wheels kissing the tarmac whilst the nose wheel remained off the ground for a few seconds; once this had touched down the effective brakes were applied to bring the model to a stop, before taxiing back.



With the turbine running the canopy/hatch is re-fitted prior to taxiing the model out onto the runway



After a very short run the powerful P180-RX has the model up to flying speed with the nose wheel just off the runway



An overhead pass confirms that the landing gear is all neatly tucked away, with the nose door firmly closed



A nice banked pass for the camera shows off the sleek and attractive lines of the Dolphin, but perhaps the model needs either a pilot figure or to have the large clear canopy tinted!

Landing gear down and locked and ready to turn onto the landing circuit



On final approach with flaps being lowered to full



Having been delighted with the first flight the model was thoroughly checked over, before it was refuelled and prepared for a second and equally enjoyable flight, with more following in quick succession. After several flights and with some very high speeds having been reached it

is clear that the decision to keep the nose door fitted was the right one, with no sign at any time of this being sucked open, the Clippard valve doing exactly what it was intended to do, and closing the door as soon as the nose leg is fully retracted.

Conclusions

Overall I have been extremely impressed with the larger Dolphin, as have all those that have seen it fly. The model is very well built indeed, uses high quality materials and is also finished to a very high standard. It assembles very quickly and there is amazing access inside the fuselage, making installation and maintenance simple. The flying performance is absolutely superb, being super smooth yet very responsive, with excellent slow speed handling, and remarkably low landing speed. I think that Fei Bao have hit on a winning formula with the Dolphin, and look forward to seeing more of them at flying fields in the near future.

My grateful thanks go to Bob Petrie for these superb pictures of the Dolphin in flight.


Jet

CONTACTS

Fei Bao Jet Models
www.fbjets.com



MODEL INFO

Name: Dolphin
Manufacturer: Fei Bao Jet Models
(www.fbjets.com) 
Model Type: Sports jet
Turbine: 160 to 200 Newtons thrust
Turbine used: JetCat P180-RX
Servos: 10 metal-gear brushless digital
Retracts: included
Construction: ARTF+ : fibreglass/Airex/
carbon fibre mouldings

SPEC.

Wingspan: 91¼ in (2330 mm)
Length: 104¾ in (2650 mm)
Flying Weight: 17.5 kg

Just before touchdown and the Dolphin is in a nice flare attitude



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Wingham Jets 2015

Karen and Jorge Escalona 'chill out' at Ontario's most laid-back Jet event



The early morning jet pilot briefing at Wingham. 52 pilots attended the 2015 event, busting past records for attendance

The 7th annual Wingham Jet Event, which takes place near the Eastern shore of Lake Huron in Ontario, Canada, is an event squeezed between the contrasts of old and new. Here, advanced radio technology from all over the globe meets the frozen-in-time culture of local Old Colony Mennonite farmers. The road to Wingham is free of traffic, framed by fields of wheat, corn and potatoes from big agricultural complexes and small family farms, and interrupted occasionally by a horse-drawn Mennonite plough or a corporate farm's colossal computerized threshing machine.

Just east of the town of Wingham, a 'no snowmobile' sign greets visitors entering the Richard W. LeVan Aerodrome, an indication that horse-drawn sleighs are not the dominant winter transportation. Summer, however, is free of extreme contrasts in weather: not too hot,

not too cold, clear skies, honest wind—flying bliss for R/C jets.

This part of Canada appears to be an "anxiety-free" zone, perhaps influenced by the spare, peaceful lifestyle of the Anabaptist Mennonites, or the lull of a pastoral landscape. Whatever the reason, Wingham is the nucleus of a 'chilled-out' flying experience. No bugs. No competing mechanical activity nearby; only the welcome sound of turbines and electrics to break the spell.

"We love our camping here in Canada," says Contest Director (CD) Blair Howkins, of Caledon, Ontario. He beams as he watches a parade of fourteen RVs and campers rolling in several days prior to the start of the July 25-26 fun fly event.

These guys are serious about camping and flying, taking advantage of three preview days for stick time flying off the 4000' x 75' paved

runway before the arrival of weekend spectators. An equal number of pup tents would begin to pop up over the grounds by Friday evening, some housing pilots, others, their scale and sport jets.

One camper, Niagara Peninsula resident Chuck Storrie, kicked back with seven members of his 'Hole in the Ground' gang from the Golden Horseshoe RC Jet Club. Storrie explained that there are at least four or more R/C "clans" in Ontario, each one offering a different kind of flying and social experience over the summer season. Of the clans, Wingham is the smallest with a dozen members, but its event is one of the pilots' favourites.

Thinking Man's Jet

No single type of jet seemed to dominate the field at Wingham 2015, although there was an impressive gathering of the 'big guns':

Blair Howkins, Contest Director of Wingham Fun Fly 2015, prepares his Tomahawk F-86 for a preview day flight. He calls the F-86 a "thinking man's plane"



RCAF Lt Col Jeff Daly got plenty of stick time on his Skymaster F-4E, the 'long nose' Phantom



Detail of Doug Boyle's Skymaster F-104 in Cf-1-4 paint scheme found on the full-scale plane at Base Borden Military Museum in Ontario

The heat trail from Doug Boyle's Skymaster F-104 'afterburner' as he quickly puts some distance between the plane and the tarmac

A-10s, F-16s, Large Hawks, Viperjets and F-104s. Among the larger scale jets were the Tomahawk designs: Kim Foster of Ohio's 3076 mm Natrix, Jorge Escalona's L-39 Albatross and Howkins 1:3.7 scale F-86 Sabre. With its elite custom cockpit detail and dominating presence, the new arrival Tomahawk F-86 is one of the most sought after R/C models today, and hard to get. Howkins had eight flights on his by the first day of Wingham. He loves the way big jets fly, their presence in the air and the scale-like performance when flown at the proper speed.

Speed is a factor with the F-86 airframe. Howkins used the Wingham event to experiment with 'elevator command' on the Korean War-era fighter. Powered by a Behotec-300F, the 50 lb+ F-86 rarely uses its full 70 lb of thrust. Howkins has learned to take-off and fly at half throttle, using full throttle only for show-stopping vertical climbs. "With the older designs like the F-86," said Howkins, "if you go too fast you lose elevator control."

On his eighth flight at Wingham, the elevator blanked out during a rapid vertical dive. The big plane "spiralled like a wounded bird," said Howkins. The elevator would not engage until the very last moment. "I thought it was history." He pointed to his Viperjet and Hawk; "Aeronautical engineers [have] learned over time...so the Viper and Hawk have huge flight envelopes, where the F-86 will have some surprises at the edges."

Howkins' F-86 doesn't fly scale at full power, nor does it like speedy landings. "If you drop

the flaps at a higher acceleration, you have no elevator." The sudden redirection of airflow knocks out the elevator function. "You have to cut the flaps, slow down, then re-engage the flaps to land." He pointed again to the Viperjet and Hawk. "Those you just fly and try to make them look scale and everything works at all speeds.

Not the F-86. You have to manage the flight, reduce speed and fly scale – and I like that!"

Howkins and Horizon Hobby's Ali Machinchy added at least five more flights on the F-86 by Wingham's end. Machinchy had hitched a ride from Illinois, USA, with Horizon sponsors, but he attended the show off the clock on his personal time.

His position at Horizon was upgraded in December to Senior Product Developer for Balsa Wood and Giant Scale products. Among his contributions to the 'clan' at Wingham was personalising Howkins Sabre with a special Cold War livery from 430 Squadron RCAF. "He found a paint scheme with my initials!" said Howkins, pointing to a prominent 'BH' on the tail.

Turbine exhaust from the start-up area at Wingham is quickly whisked away from the pits by a pristine breeze down the runway. With 62 pilots in attendance, and over 140 scale and sport jets on hand, there would always be a spot free at four pilot stations. The sun becomes an issue by late afternoon, but with an early morning start, there is plenty of time for multiple flights. The only downside comes into play with gear malfunctions or flameouts. Crops hug a lower elevation at the far side of the

runway with little room for grass landings. The tarmac's smooth, unbroken surface offers an obstacle-free belly landing (and free sanding!).

One pilot and camper, Jean-Claude Terretaz of Carp, Ontario, belied his Christen Diffusion Mirage atop wheat stalks without breaking the retracts. The nose took a beating when Terretaz was forced to abort his landing and go around to make way for an incoming full-scale. His Jets Munt VT80 engine gasped on fumes alone. But Terretaz remained upbeat, "It is my first flight with the Mirage and now I know what it can and I cannot do!"

Terretaz said he always relies on RCJL's turbine comparisons by Colin Strauss when deciding on a new engine purchase. The Jets Munt is his most recent acquisition. The incoming full-scale, one of only four the entire week, turned out to be an R/C jet enthusiast flying in for the event.

Commercial-Free

Wingham is one of Ontario's six jet events throughout the summer, but remains the only jet-exclusive venue. Like Machinchy, many of the registered pilots are hobby shop owners, dealers and reps, leaving commercial pursuits behind for some personal stick-time in this 'no business' atmosphere. The event is so laid-back, even CD Howkins had time to fly his stable of Tomahawk jets – yet another reason why Howkins would like to keep the event small. "The social side of things is really important here." But that might be a challenge as word of this gem of a field spreads.

The Tomahawk F-86 flown by Howkins is painted and detailed to replicate the 430 Squadron RCAF and just happens to have Howkins initials as markings



Jorge Escalona's Tomahawk L-39 makes flying look easy. After his great experience in clear blue skies at Wingham, Escalona has decided to add smoke tanks to the Albatross for dramatic effect



8 year old Simon Squire, of Goderich, Ontario, was the youngest R/C pilot at the flight line. He operated a Taft Hobby Viperjet



Jorge Escalona (L) of New Jersey and Kim Foster of Ohio came from 'south of the border' to fly and went home with the Best Military Jet and Pilots Choice Awards for Escalona's Tomahawk L-39 and Foster's Pari Tech Natrix, respectively



The 'Wild Weasel' paint scheme appealed to Jeff Daly in terms of masking the F-4's profile 'blemishes'

Built to look like a sleek chase vehicle, this Viper Jet has the look of a predatory feline



One R/C jet product dealer who makes the yearly pilgrimage to Wingham is Doug Boyle, of Jet North Jets in Selwyn, Ontario. His Skymaster F-104 is done up in the CF-104 paint scheme found on display at Base Borden Military Museum, Borden, Ontario. The custom scheme is not currently part of Skymaster's livery offerings. A new Jet Central Rhino SP powers the jet with 45 lb of thrust. "You would think it's a missile with those little wings," says Boyle, "but the big surprise is, it's not as intimidating as it looks. It's actually a very gentle flyer."

Boyle has enhanced the management of the F-104 with a Power Box and iGyro that helps in flight. But he's found the plane flies just as stable without the gyro. "It was a little squirrely in the crosswind today – too much gyro on the rudder, so we took it off and the plane stabled out." Boyle admits the iGyro is helpful for take-off.

Along with the custom paint scheme another hard-to-get feature is a custom, fully operating, side-articulating canopy, just like that on the full-scale F-104. With Futaba servos and a Futaba 18MZ, Boyle uses all 18 of the radio's channels. "Because of the canopy," he adds, referring to the articulating canopy, "but the plane can get away with using 12 channels."

Boyle joined local resident Sandro Novelli and several others for a scheduled formation flight of four A-10 Warthogs at Wingham 2015, but a problem with the intake on his right

engine kept him out of the air and Saturday's sudden crosswind sidelined the others.

The one exception was Novelli, who flew his Skymaster A-10 despite the phantom wind. Powered by twin Jet Central Cheetahs pushing 64 lb of thrust on a 74 lb plane, Novelli's A-10 is highly modified, full of ordinance and just plain massive. Novelli was confident in tough turns against the wind because of extra carbon fibre reinforcement throughout. "It's very draggy in the air so you have to really be on top of the power management."

Beautiful weathering detail, including sand-blasted and painted gears earned the A-10 the beefiest spot in the sky and allowed Novelli to take home the Wingham Top Gun Award for 'keeping it going', as Howkins remarked at the banquet. This included snaps (slang word for praise) for Novelli's brilliant landing of a big Ultralighting after a flame out.

"I didn't realize how big an event this actually is", said Sharon Zinn, Municipal Councillor for Morris/Turnberry as she officially welcomed the registered R/C pilots at a Saturday morning



Cockpit detail of Blair Howkins' Viperjet 'Interceptor' painted to resemble a police chase vehicle in Jaguar theme



Peter Ayache of Mississauga, Ontario, was won over by this Aviation Designs Diamond. He usually flies scale but the Diamond has brought him happily to sport jets

Howkins' Viperjet Interceptor, powered by a Jet Cat P-200, goes vertical over Wingham



Local Ontario resident Sandro Novelli flexes the muscles of his Skymaster A-10, it is powered by twin Jet Central Cheetahs



pilots' briefing. On hand were other officials including Peter Douppnik, of Windsor, Ontario, the 'Zone M' Deputy for the MAAC (Model Aeronautics Association of Canada) for South-western Ontario. He and Angus MacDonald helped originate the Wingham event and have watched it multiply in size under Howkins direction from 20 to 60 pilots in seven years. According to Douppnik, attendance by both pilots and spectators at Wingham 2015 was a record-breaker for this small rural town of 3000.

MAAC and AMA members can cross borders between Canada and its southern neighbour, however UK and European R/C credentials are not valid. Douppnik says pilots should plan to cross the pond in the month of August, bringing their jets for a 'flycation' to cooler average temps and clear skies of Ontario. They'll find many events to attend, but they will be obliged to temporarily join MAAC and be certified locally. Canada's JPO (Jet Pilots Association) representative RCAF Lt. Col Jeff Daly doesn't see any impediments to



The custom canopy of Doug Boyle's Skymaster F-104 is not easy to come by. This one, a special order from Skymaster, has a fully operating side-opening mechanism that locks back in place. Boyle uses all 18 channels of his Futaba 18MZ to include articulating the canopy



Ken Park of Ottawa earned the Best Electric award for this JTM 90 mm Viperjet powered by a Stumax fan

the process, "Canadians are typically 'follow-the-rules and you're in' – we're not paranoid."

Zinn agrees there are many local activities in the Lake Huron area to keep pilots and their families happily engaged during the vacation months. For non-campers, accommodations range from first class hotels and spas like the nearby Benmiller Inn to a no-frills local motel just moments from the field. Modest Menonites notwithstanding, there is no shortage of locally-sourced restaurants, art and music and theatre venues, cafes, fast food chains, sports and water parks, and lively bars throughout the area. A number of military aviation museums are located within the province limits of Ontario.

Daly briefed the pilots on the JPO 'Smackdown Aerobatic Challenge' held Saturday at Wingham. Eight pilots tried their hand at completing a specific circuit of seven manoeuvres – judged by Horizon's Machinchy – for the opportunity to win the Smackdown Champion trophy. As if on cue to increase the odds, a defiant crosswind picked up just as the pilots began their circuits after lunch.

The wind turned a mid-day 'Mass Foamy Launch' into a hilarious slapstick scene that appealed to the younger spectators. One young pilot attending Wingham each year, Simon Squire, an 8 yr old from nearby Goderich, On-

tario, demonstrated his abilities on an electric Taft Hobby Viper Jet with his dad, Jeff, at his side. "At 4 yrs old he started flying a radio-controlled bird," said his father. The Taft Viper is his first jet.

White Diamonds and Speed

Another local father/son combo at Wingham 2015, Frank and Mike Basso of Guelph, Ontario, flew non-stop throughout the event. Mike, at 19, has been flying for seven years. He participated in the Smackdown Challenge with a Comp ARF UltraFlash powered by a JetCat P120, all Spektrum digital high-voltage servos throughout, and JR 12x control module. The Bassos applied grey fleck paint to the interior of the Flash, "just to make it not look like fibreglass." The younger Basso has no reservations about speed, declaring that the Flash has been clocked well over the speed limit.

The elder Basso had been flying Ducted Fans and props for years but mothballed his hobby until Mike discovered a plane in their basement. "We took it out and got into the hobby again – Big Time!" says Basso. They purchased a Tom Cook T-33 to retrofit and installed a Jet Cat P-140. "It's a great flying plane – a lot of fun," says Mike. When asked how he fared on the Smackdown, he shrugs his shoulders. "The main comment was 'learn

Carp, Ontario resident Jean-Claude Terretaz recovers his Mirage from a somewhat soft landing in an adjacent wheat field. Forced to abort the final approach of his maiden flight, the Jets Munt VT80 engine had nothing but fumes left



the rules'." If he's as fast at studying as he is a pilot, he should be in good shape for next year's competition.

Speed is what delights Peter Ayache of Mississauga, Ontario, now that he's purchased the new offering in sport jets – the Aviation Designs Diamond ARF. The kit is quick to build and quick to fly. "I've been flying scale for the longest time," says Ayache as he charges the batteries to the bright white Diamond, "but I've been won over by this plane."

He wasn't impressed by the prototype he saw at Jet Power in Germany, considering the paint scheme, the futuristic CAD design and the way it fishtailed without gyros. "But then 7 or 8 months ago I saw the white scheme and liked it." Within a speedy two weeks and one weekend from the kits arrival, he had it together and ready to fly. "A lot of work is done for you. It's very simple!" He inserted a

Which object is scale – the pilot or the plane? Ali Machinchy of Horizon Hobby does a pre-flight check of Howkins' Tomahawk F-86

Behotec 220 with 50 lb of thrust to the 42 lb Diamond. "It penetrates the air so nicely!"

Ayache is normally a Futaba man, but for this plane he installed a JETI model receiver, GPS sensor and engine ECU converter. Ayache is fascinated by the technology, tracking engine temp, exhaust temp, fuel flow, latitude, longitude, speed, voltage, "everything"! He clocked 20 flights before attending Wingham. "It makes it quite interesting, a bit more entertaining as far as flying the plane, that's why I like it." His

Kim Foster's PariTech Natrix won the Pilots' Choice Award at Wingham 2015. Foster says the Natrix is the largest of sport jets available today



scale jets may have provided the opportunity to fly smooth and soft. "But this plane...I can't help myself! I want to hammer it hard and it takes it – extremely strong air-frame!"

The Diamond, like most long, thin, projectiles with high tail surfaces, doesn't like crosswinds during landing. But the high stance makes it perfect for grass. "By holding the nose down and then flaring with a bit of elevator, you can actually bring the nose up and roll right in!"



Jorge Escalona gets one more flight in on the last day before reluctantly returning across the border to the US. His Scale Jets F-16 is powered by a Jet Cat P240



Toronto resident Doug Boyle enjoys the Wingham atmosphere of 'no business'. This busy Skymaster dealer comes to the event to fly and relax with his Skymaster A-10 Warthog. Here he appears to be seated 'under' his plane!



'RC Pete' Harasrewicz had the chance to come back to his Canadian roots at Wingham Jets. Here he flies his 2.5 m Tomahawk Futura in Olympic livery



This Reaction hybrid, the 'Phoenix', is flown by Canadian, Jim Brown, who frequents jet events in the US. Nice to have some time in his own backyard



The camo paint scheme on Doug Boyle's Skymaster A-10 is rather effective against Wingham's surrounding landscape

Ayache's contribution to the clan was sponsoring lunch for all the pilots and crew for Friday and Saturday of the event. His Diamond earned him the Wingham 2015 Best Sport Jet Award at the Saturday night dinner hosted by CD Howkins and his wife, Tamara. Out of 8 competitors, Brian Mayhew copped the JPO Smackdown Award with his Flash and Tim Redelman of Horizon Hobby came in second with his BVM UltraBandit. Kim Foster won the Pilots Choice Award for his superb handling of his Pari Tech Matrix, and Jorge Escalona took home the Best Military Jet for his Tomahawk L-39 Albatross.

Ken Park of Ottawa received the Best Electric for all of his electrics, but especially a JTM 90 mm Viper powered by a Stumax fan. "We threw a Canadian sticker over the Swiss paint scheme" admitted Park.

The final award of the evening, the JPO Top Gun, was presented to Blair Howkins by RCAF Lt Col Daly: "For someone who has contributed in many ways to the endurance of this event, brought nice aircraft, and who has literally taken care of everything for the rest of you guys." Applause and live music closed out this special gathering of the R/C jet clans from Ontario and beyond at the 2015 Wingham Fun Fly. Seems a shame to have to wait a whole year to come back.

Jet

This Aviation Design Scorpion powered by a Behotec 220 casts a shadow on pilot/owner Jack Marcotte of Hamilton, Ontario, as it passes the centre line



The 'Warthog Line-up', ready for a noon demo



Wingham Jets Fun Fly is the only 'jet exclusive' event in Ontario to date

Sandro Novelli's Ultralightning takes advantage of a crosswind for a quick turn after take-off



CONTACTS

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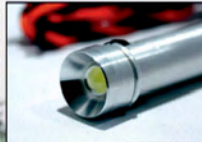
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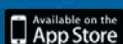
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Karlskoga Jetpower

Daniel Larson records the sights and sounds at one of Scandinavia's premier Jet events

Arve Listerdal Jensen flew his A-10 from Mibo extraordinarily well! Very slow speed in narrow manoeuvres like in a full scale during a mission!

The Swedish summer has been quite British: a lot of rain and very cold! However, the first weekend in July was the warmest weekend of the whole summer, and luckily it was then that the R/C club of Karlskoga organized their yearly Jetpower, the 8th Jetpower organised by Karlskoga RC club.

As usual many pilots arrived early on Wednesday, and so did I. I arrived just after 1 pm and was the 27th pilot registered. The hangars were busy with activity as arriving pilots assembled their planes, programmed the on-board electronics and tuned the mechanical systems before flying.

As usual, the Norwegians were there in great numbers, both in people and models. Not surprising since the event took place not far from the Norwegian border. The current trend is that Norwegian pilots prefer scale models while the Swedish pilots have more sport jets to fly pure aerobatic. There were more than 65 pilots registered with about two planes per pilot on average. Some of the planes and pilots that I liked a lot were...



Trond thinks that the 1:5 scale F-100D from Air-World is one of the best planes to fly; scale like, aerobatic, with a wide speed range and easy to land

Hey Good Looking!

Niclas Robertsson, who flew his homemade, full carbon JAS-39 Gripen in 1:6 Scale. This is a project done in collaboration with Jonas Bergström. New for this year was that Niclas has painted his Gripen and added some scale decals. Next step will be to build scale gears and cockpit.

Christian Melgaard's Lightning has about ten years of production behind it. From the beginning and when Christian was about to renovate the Lightning he didn't know which

colour scheme to go with. His daily work is as a custom car painter and he got a Porsche to paint in the Gulf racing scheme from 1973, he then realised that the Gulf 'retro scheme' would suite the Lightning perfectly!

Christian also flew a Diamond from Aviation Design, the plane that you love or hate! I don't know anybody who is neutral to this plane. I think its looks are very Flash Gordon!

Since Christian is a custom painter he was very specific in his demands to Aviation Design when ordering it, he wanted it paint in Ford's 'Electric orange pearl'. Eric Rantet at Aviation Design said that it was OK, as long as it wasn't pearlescent colour! Christian said, yes of course "Electric orange pearl is pearlescent colour", and so it was delivered, said Christian, with a big smile!

The Diamond was so beautiful with its shimmering orange light in the air when the sun lit up the plane. The Diamond has very good slow flying characteristics with full flaps and it can fly very fast without the flaps; Christian has registered 420 km/h with his GPS.



Geir Flesche is taxiing in after his flight with a big Skygate/Carf L-39 equipped with a AMT Olympus. In the background is the clubhouse where the Karlskoga club served food and ice cream during the meeting

Specially ordered Aviation Design Diamond by Christian Melgaard. The paint is Ford's 'Electric orange pearl' Equipped with a ATJ 190 SV and Behotec's C-50 electric retracts, ready to take-off weight is 23 kg



A nicely built MiG-21 from Airworld. 140 cm in wingspan equipped with a Behotec 180 gold edition and a fuel cell of 5 litres. Ready to take-off weight 21 kg. The owner is Kim Heyerdahl



Tor Hermod Christiansen taking-off with his Skymaster F-16 in 1:6 scale. Equipped with a Behotec 220 and a fuel cell of 6.5 litres, this configuration gives Tor a flight weight of 23 kg and 11 minutes of flight

Kim Heyerdahl came as usual with a trailer full of planes, one of them was a L-29 Dauphin from Air-C-Race in Germany, with a wingspan of 235 cm, the painting is customised after a full scale L-29 stationed in Norway and it's owned by 'Russian warbirds of Norway'. The model is equipped with a Merlin 140XBL and has a weight of 20 kg. With a fuel cell of 4.5

litres he has 10 minutes flight with a margin.

Tomas Krejci had built a nice sport jet from Aviation Design, a Scorpion that usually flies very well with a 100-size engine. Tomas has installed a Hawk Turbine 190R with a fuel cell of 2.8 litres, and it flies like a rocket for 10 minutes with a margin. Even though the model is painted in a very dark colour it's quite



Geir Flesche has built the A-10 Warthog that Arve flew at Karlskoga Jetpower. The weathering and scale details are remarkable, only a trained eye could tell the difference on a photo from a full size

easy to read its position in the air. The smoke system is working very well and Tomas uses a bag for the smoke oil in order to avoid air while using it.

Trond Hammerstad came with his F-104 Starfighter this year to, he has changed his B300F turbine against a Behotec JB220. With 4.5 litres of fuel he flies for 6-7 minutes. Trond has equipped his F-104 with 15 mm flares from Maxotronic, with exchangeable containers with 27 flairs per container, that are very striking while flying.

The big Futura from Tomahawk equipped with a Hawk Turbine 190R flown by Thomas Smordalen. This beauty has over 19 hours flight time now and still going strong. With the original fuel cell of 5.2 litres, Thomas can fly for 20 minutes with margin





Kim Heyerdahl's L-29 Dauphin takes-off. Kim's flying was exceptional and scale-like

Thomas Smordalen came with a big Futura from Tomahawk Design equipped with a Hawk Turbine 190R that was built and flown a few years ago by Lars Bexander. When I asked Thomas about the turbine's runtime he said that the engine has over 19 hours without any maintenance from the manufacturer and works as well a Swiss made watch! Anders and Carl who attended Karlskoga Jetpower think this is nothing extraordinary if you look after your turbine; this turbine will do at least the double that and little more before its first service.

Björn Johansson from Lund came with an electric 'rocket', an Electra from BVM with a 120 mm EDF running on a 12S 7000 mAh LiPo battery that delivers about 7 kg of thrust, which gives a thrust ratio of little more than one to one. Björn flew for about 6 minutes with a speed span of 35-300 km/h.

Recognition

This years 'Best in show' (no official award, but what the audience and pilots were very interested in!) was the return of the A-10 from Mibo in 1:5:8 scale, that Geir Flesche built sev-

eral years ago, now owned by Arve Listerdal Jensen. The A-10 has a wingspan of 300 cm, equipped with two BF100 and 3.2 litres of fuel per turbine, that enables Arve to fly for around 7-10 minutes.

Arve is an extraordinary pilot that flies his A-10 very scale-like, when you see him flying you understand that Arve been training a lot! Arve flies his A-10 very slowly, so slow that you think that it will fall out of the sky at any moment! He also does very narrow, scale-like turnings, like a real A-10 on mission, just amazing!



Kim Heyerdahl is taxiing out his L-29 Dauphin on the runway, while Frode Ljøterud is taxiing in his Aeromacchi MB 339A after landing. The flight line moved fluently with minimal organisation

Ultra Bandit from BVM owned by Lasse Palm that he built in 2008, and has had over 100 flights. Equipped with an AMT Olympus and fuel cells with a capacity of 6.2 litres for a total weight of 22 kg. Flies for 15 minutes





A realistic photo of the F-4 Phantom owned by Kjell Persson. The Phantom is a kit from JetLegend equipped with a Behotec 165, with 4 litres of fuel the model weighs just over 20 kg and it gives it a flight time of 6-7 minutes



Tom Storvik from Norway in relaxed mode in the ready box with his JAS-39, just waiting for the signal to start up and fly his display program



Trond Hammerstad has equipped his Starfighter with flares from Maxotronic. It was spectacular to see the flares released during the flight. Each container holds 27 flares. The pilot controls the flare release sequence with a three-way switch



Kim Heyerdahl chose the L-29 Dauphin because it's a very nice plane and not so common. The kit is from Air-C-Race in Germany with a wingspan of 235 cm, equipped with a Merlin 140XBL, a fuel cell of 4.5 litres and 20 kg in weight allows Kim to fly for around 10 minutes



Trond Hammerstad's new F-100D in 1:5 scale from Air-World equipped with a Behotec JB220, the ready to take-off weight is 25 kg and with a fuel cell of 4.5 litres Trond flies for 6-7 minutes

As at last year's event Uno Andersson, a retired Air force pilot with over 1500 hours on the Swedish Draken, was nominated as public speaker. He did extraordinary research work on his iPad to find information about the flying models that he mixed up with his own experience and stories that he had heard during the years, and very interesting to listen to indeed!

As usual the R/C club of Karlskoga did an amazing job with the organization, including helping pilots to transport models and equipment from the hangar to the ready zone, and up in the clubhouse the barbeque was lit up all weekend to make burgers so we didn't starve! With the weather playing ball it was an excellent meeting enjoyed by all! Everybody is now looking forward to meeting up in Karlskoga next year, bring it on! See you in 2016!

Jet

WEBSITE

kmfk.org

BELOW: Really nice to see two A-10 Warthogs lined up in the ready box. Arve's A-10 from Mibo in the foreground and Frode's A-10 from Skymaster in the background



To avoid interruptions in the smoke while flying, Tomas uses a bag for the smoke oil



Tomas Krejci custom built the smoke system on his Scorpion. The smoke oil is injected just after the turbine. He has programmed his radio so he needs a certain amount of throttle to activate the smoke system. This avoids pumping oil into the thrust tube that wouldn't be fully combusted

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Jet Chatter

Do we care for our models enough? Dave Wilshire explains why and how we should look after them from the outset, looks at servo voltages, powering digital servos, and top tips failsafe settings

Our Hobby Is Not Just About The Flying!

I've asked quite a few people what part of the hobby they enjoy most, i.e. building, owning, or flying? It's clear people have different priorities. At events some people never stop flying and others are happy to have a couple of flights, before spending the remaining time sitting in the pits with their model.

In the UK the majority still seem to assemble their own models, but it is getting closer to an even split with 'hobby' time spread too thinly. There are just too many fun things to do, all of them so accessible and available for your spare cash.

Equipment has become so reliable that models can last for years. Like cars and bikes, people will pass them on after a while, but good quality gear is only part of the requirement for a long life.

Apart from selecting a good manufacturer, knowing that the airframe was assembled with quality glues and protected against future deterioration is just as important. The internal finish is almost always left to the person assembling the airframe; the vast majority of composite airframes still have wooden formers supporting the structure.

Looking around models I see at events I'm amazed by some people's apparent model life expectancy. I can only presume they expect

a short life, by the fact the wood parts are left plain and untreated, ready to soak up fuel, which is basically runny oil.

There cannot be many people flying turbines who have not been through the fuel burning model stage. Even from my earliest days I remember fuel proofing the inside of the fuselage, paying particular attention to the tank bay and motor area. Turbine models are the same!

Balsawood soaked in oil loses all of its excellent qualities; the open cell nature of the wood soaks up the oil. Just because plywood is generally formed from hardwood and is resin rich, does not stop it soaking in oils. Any joints will be compromised once soaked in the oil and our composite airframes still rely heavily on wooden formers to support flight and landing loads.

I have always sealed the wood with epoxy finishing resin; two coats are enough generally. It's also possible to paint this for a nice finish. I pick colours that don't show fuel stains as many oils leave a yellow stain, so white is not a good colour.

Small fuel spillage is annoying, burst tanks and 'popped' fuel bungs can empty litres of fuel into your fuselage. Smoke oil is even worse and seems to get everywhere! Protection takes very little effort to do, so why skip this important step.

Servo Voltages

Your chosen brand of radio does not tie you into their range of servos; certainly in the UK JR servos can be found in the majority of jets. This choice goes back to a time when we had not seen a single Lithium battery.

On many of the JR Propo servos, the operating voltage is stated as 4.8 V. This is very misleading as there is no energy source (battery) that actually gives out 4.8 V. Most popular power management devices are generally set between 5.5-6.0 V for non-HV (High Voltage servos).

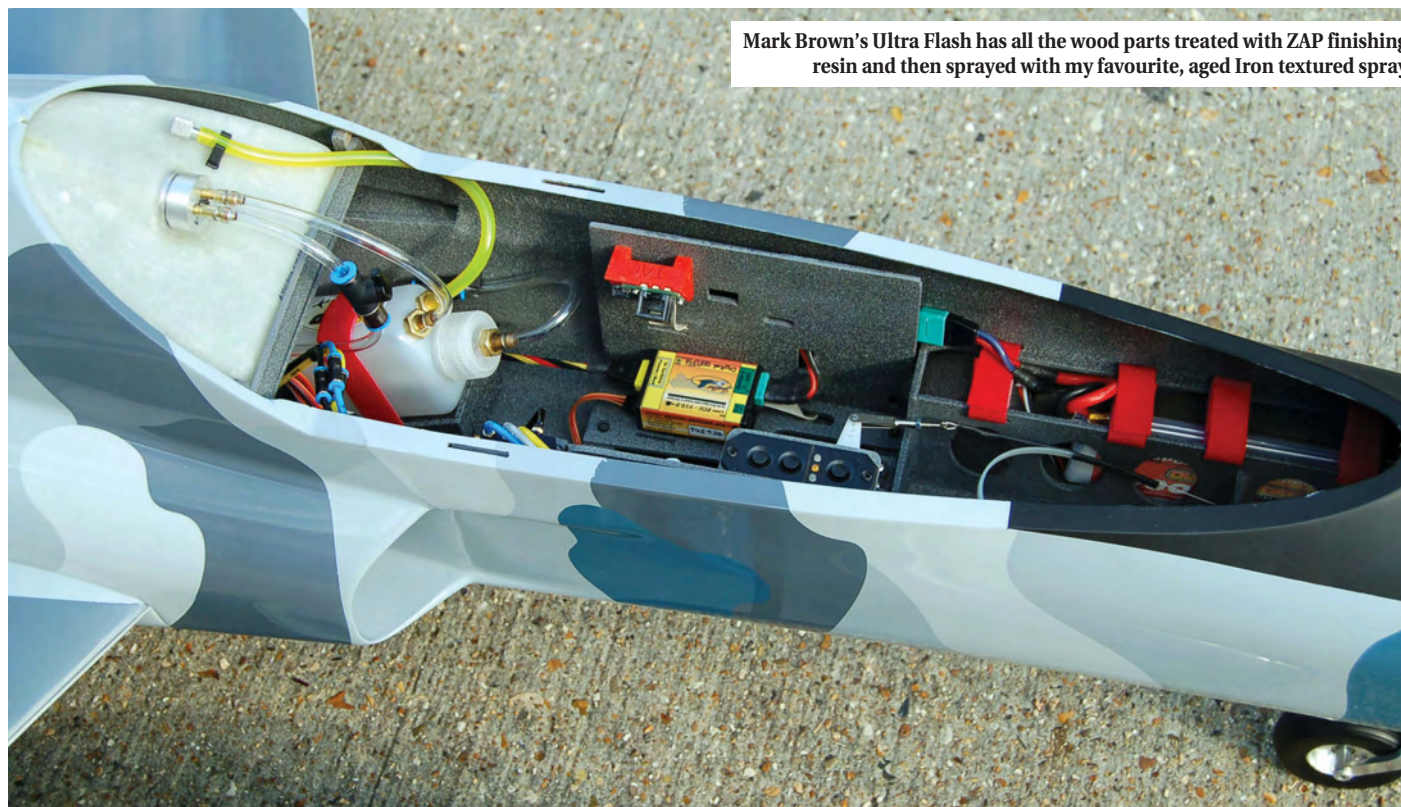
The 4.8 voltage term comes from the four-cell (4N NiCad/NiMH) style cell packs, which nominally each have an individual cell voltage of 1.2 V ($4 \times 1.2 = 4.8$ V). This voltage is really only applicable when the packs are near flat.

The Ni** type of cell reaches 1.5-1.57 V per cell towards the end of a charge, so 6-6.3 V pack voltage before the voltage settles. In use a good pack will deliver 5.7 V, so as you can see, even on a 4-cell Ni** battery none of these servos actually operate at 4.8 V!

Electric flight speed controllers that feature a BEC (a feature that supplies your receiver its power down the throttle lead) will normally be set to give between 5.5 and 5.6 V, also above 4.8 V.

Seen at long Marston JMA event, this well-maintained Lightning belongs to Luke Metcalf (TvG photo)





Mark Brown's Ultra Flash has all the wood parts treated with ZAP finishing resin and then sprayed with my favourite, aged Iron textured spray

The popular PowerBox products have been used by thousands of modellers and feature in all my jets and more than 50% of my personal fleet of models. These devices mostly produce an output voltage of 5.9 V and many thousands of flights have given me zero servo or radio failures!

The reason JR say that 6.0 V should not be used on these servos is because people would think of a 5-cell (5N) pack as 6.0 V. Again as mentioned, this is a near flat voltage based on 1.2 V per cell. The reason this pack is not suitable for JR servos is that 5 x 1.5 volts is 7.5 V and that's HV territory!

To remove any chance of using the wrong voltage, JR have introduced Wide Voltage servos, WV servos will work between 5 V and 8.4 V, with obvious differences in speed and power.

Digital Servos

Why we should use them?

Non-digital servos have poor holding power, this is due to the servo's motor not being powered constantly in the way a digital servo's motor is. Also a standard non-digital servo does not produce its stated torque until it is moved some distance; it builds up to it each time it moves.

For our jets holding power is more important than the actual torque developed. If it can't hold its position under load, it will allow blow back and you get a spongy feel to the controls.

You can have the same servo motor in analogue and digital servos (the actual complete servo design, other than the processor driving the motor from the receiver's information can be the same). The majority of servo motors in digital servos are coreless type, offering faster, smoother response due to lower moving mass within the servo motor.

The advantage of a digital servo is the near

instantaneous response to any attempt to move the servo arm, in most cases by loading. When a control input is requested, all the servo torque is available the instant you start moving the control stick, this is from any stationary position, centred or part way across the stick travel.

The biggest gain is the holding power; a digital servo will almost 'lock' solid at any position. So if you move a surface to a position, it will stay there.

The dead band is also less due to faster response time. This can be the only downside of a digital servo. Heavier surfaces with free hinges, coupled with long control arms can create enough force to move the servo centre position away from the centre point and the servo responds to this and moves it back quickly.

Trouble is the mass of the surface can make a servo over shoot and it goes past the position it was looking for and the whole thing starts again. This can cause a surface to buzz or flutter on the ground. Stabilising the surface will stop it and in the air the airflow supports and dampens this tendency.

Many of the programmable servos now available allow tuning of the dead band. Fast servos can be adapted, so rather than stopping suddenly they decelerate and accelerate with less urgency, but still keeping the power.

Reducing the servo arm radius to keep it as short as possible will reduce the chance of this happening as it reduces the leverage on the servo.

It is always best to use the shortest servo arm possible; most servo torque figures are quoted at 1 cm radius, so geometry with long servo arms and short surface horns reduce the torque.

You can tell a digital servo by the 'tone' noise they make when any load is applied. Just the friction from linkages is enough to have the



This is how Mark's kit came before the woodwork was sealed and painted. The wood trays are supplied loose, so easily treated to the same finish



4-cell 4.8 V NiMH on charge at 0.9 A



After 2 mins 5.86 V and after 7 mins 6.18 V...so not 4.8 V!

motor powered and they sing. This does not mean they are overloaded, but you do need to understand whether a servo is screaming for mercy, or happily controlling the load.

So, summing up-max torque is achieved much quicker, from a fraction of a degrees movement. Holding torque is much greater than analogue servos, processing speed is



Digital servos have good holding power and should be used throughout installation in turbine-powered models (Dave Gladwin photo)

greater. This is achieved by powering the servo motor longer and sending information to move position faster.

Fail-Safe Settings

The step of setting your fail-safe is often overlooked, even though it is hugely important. In the UK we have a minimum requirement of the turbine going to idle. This varies with sites; if the JMA run an event where there is an increased fire risk, we can change this to turbine stopped.

There are valid arguments over both options, but overall the most important thing to remember is we don't want any crashes!

Stopping the turbine completely on a heavily loaded jet guarantees a difficult landing at best it gives little chance of recovery, from what would almost certainly be a tricky situation.

Operating our models on 2.4 GHz reduces the likelihood of a fail-safe occurring. Outside interference is greatly reduced – though not totally as some may think! Either way the fail-safe only deals with a lack of signal getting through; it does nothing if there is a power failure!

Care needs to be taken in ensuring the failsafe you set actually functions: some dual Rx systems require you to set the fail-safe in the unit and not via your transmitter.

Although the primary safety concern is closing the throttle, I also fail-safe the gear, flap and any airbrake function the model might have. My default setting is gear down, flaps down and airbrakes open.

The gear down option comes from 35 MHz days, when the chances of a loss of signal were much greater. If the model is well trimmed and flown smoothly you could have lost control and not realised immediately; by the time you did it may have flown further out of signal range making recovery harder. Seeing the gear cycle was a warning that is easy to see. Dropping the flaps and airbrakes adds maximum drag slowing the model down, again more time to react!

Jet

Contacts

Dave Wilshe
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Semi-scale gear by Unitracts (air up and down) with brake on nose wheel.

Article on building and flying featured in RCJI April/May 2015.

See the maiden flight with Steve Holland at the controls at <https://vimeo.com/107351013>

£3,000 ono with everything except Rx and including a custom built trailer. Reason for sale - lack of suitable flying sites in Gloucester area.

Contact Tony Pearson 01452 750174/07749 414186 for more details.

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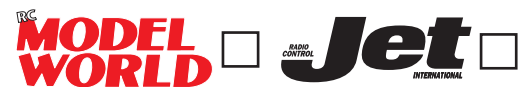
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(Nigel Cartwright photo)



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All contents are subject to change without notice.

The April/May 2016 issue 137 will be on sale Thursday, March 17th 2016

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Scale Length Width Thrust
1/7 70" 48" P60-P70



Scale Length Width Thrust
1/10 57" 47" MW-44-P-60



Scale Length Width Thrust
1/6 97" 64" P90-P120

Xcalibur



Scale Length Width Thrust
77.5 73" 50-100N

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GJC JHH F-86

GJC JL F-16



Scale Length Width Thrust
1/6 71" 67" P80



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1/9 50.5" 50.5" MW



Scale Length Width Thrust
1/6 97" 64" P90-P120

GJC JL F-4

T2 Buckeye



Scale Length Width Thrust
1/7.5 88" 63" P120



Scale Length Width Thrust
1/4.5 104" 104"

Skymaster F-14



Scale Length Wingspan Power
1/7.5 100" 104.9" 18-27Lbs x2 (8-12kg x2) thrust

Viper Jet



Scale Length Width Thrust
1/6 75" 72.5" 16-24 LBS



Scale Length Width Thrust
1/4.5 104" 104"

Rafale



Scale Length Width Thrust
1/6 97" 63" P160-P200

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Scale Length Width Thrust
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1/7 80.25" 49" P60

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Scale Length Width Thrust
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